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LEPROSY.

LOWE (John). **Leprosy in India. The Present Outlook.**—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 208–210.

This is a carefully considered review of the leprosy problem in India based on eight years' experience of about 5,000 cases seen and 3,000 treated, with the great advantage of most of them being under close observation in the Dichpali Leper Institution. The author rightly deprecates both the unwarranted pessimism of some British writers and over optimism of a S. Indian non-medical man, whom he quotes as stating "Within a few years this dreadful disease may become a thing of the past." He agrees that the disease is acquired by contagion, is not highly infectious and is predisposed to by bad social and hygienic conditions, and there are probably at least 1,000,000 lepers in India. After pointing out that advanced cases tend to accumulate in an institution to the detriment of good results, he deals with 464 cases treated for from six months to eight years. He brings out the interesting point that after treatment the nasal mucous membrane became negative as regards bacteria in 221 out of 309 originally positive cases, but the skin became negative in only 65 of 393 cases, and that the bacilli persist in small numbers here in cases which have become inactive especially in C3 (advanced skin) cases. He concludes that as the result of prolonged treatment (1) almost every case of the disease ceases to progress; (2) in some, mostly early cases, no bacilli or activity remain; and (3) in more advanced cases progress is arrested, the lesions decrease, the nasal discharge can be rendered free from bacilli, thus much diminishing infectivity, and the disease becomes inactive, although acid-fast bacilli may remain in the skin. He points out that compulsory segregation for India's million lepers is impossible, and that the present propaganda and survey work is valuable, but that the out-patient clinic treatment is handicapped by the difficulty in getting regular attendance for sufficiently long periods. It will require therefore much patient work to reduce leprosy materially in India, and further research is necessary to furnish still better methods of control. *L. Rogers.*

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LEPROSY IN INDIA. 1932. Jan. & Apr. Vol. 4. Nos. 1 & 2. pp. 1–49 ; 51–120. With 3 figs. & 4 maps in text. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

In these issues the following are the most interesting points. E. MUIR reports on a trial in the Purulia Leper Colony of Solganal B_2—so long advocated by A. PALDROCK as a specific for leprosy—which can be given intramuscularly. Among fourteen cases treated with the aid of control sedimentation tests not a single one showed any improvement, and in no less than eight the injections had to be stopped on account of injurious effects, including bad reactions, exhaustion, progressive weakness, etc. Moreover, so far from being beneficial in eye complications, as claimed, it proved harmful by inducing dangerous reactions, and setting up intraocular inflammation in three cases. This treatment was therefore found progressively to lower the patient's general resistance and it is considered to be dangerous.

The intradermal leprolin test advocated for diagnostic purposes by BARGEHR has been tried by R. G. RAO with leprolin prepared from both a normal non-reacting and from a reacting case, but it was not found to be of any specific value, for intradermal injections of sterile salt solution sometimes produced similar reactions.

A survey in the Midnapore district of Bengal by K. R. CHATTERJI revealed four times as many cases as were previously known. House infection accounted for 54·7 per cent. and association 22·8 per cent. A clinic was opened and 60 per cent. of the discovered cases enrolled, and among these the average daily attendance was 80 per cent. In another survey in the Kangra Valley district a history of previous contact with a leper was obtained in 80 per cent. of the cases.

E. MUIR records instances of infection of the higher castes through the employment of low caste lepers for milking and shaving. He also deals once more with the value of potassium iodide only in recovering cases with negative bacteriological examinations of the nose and skin.

L. R.

LULL (George F.). **Leprosy in the Philippine Islands.**—*Milit. Surgeon.* 1932. Feb. Vol. 70. No. 2. pp. 138–144. With 1 text fig. [15 refs.]

This is a brief account of the well-known history of the Culion leper settlement and the recent establishment of local leper hospitals and skin dispensaries. The importance of improvement in diet is noted, and the best results of ethyl ester chaulmoogra treatment have been obtained in children with 54 per cent. of 70 cases becoming negative, and 67·5 per cent. of slightly advanced cases. Since intensive treatment has been used at Culion and at various treatment centres 2,448 lepers have been released as negative. Since 1907 $20,000,000 (about £4,000,000) have been spent by the Philippine Government on the segregation and care of lepers—a high proportion of the total public health budget. *L. R.*

RODRIGUEZ (José). **Leprosy in Cebu, I.**—*Philippine Jl. Sci.* 1931. July. Vol. 45. No. 3. pp. 459–481. With 2 text figs. (1 map).

This full report begins with the geographical and climatic conditions of the Island of Cebu, where leprosy is very prevalent, although the

climate is described as being " dry " with a rainfall of 1,500 mm., or 60 inches a year, and this is said to disprove the theory of ROGERS that there is a close relationship between the prevalence of leprosy and a heavy rainfall. [In Rogers' map of the world distribution of leprosy high rates were shown in just those warm areas with 60 inches of rain and upwards, and the tropical areas with little or no leprosy had less than 10 inches annually.] Historically the old statement ascribing the origin of leprosy in the Philippines to the introduction of 130 Japanese lepers in 1630 is disproved by the fact that cases were being cared for in Cebu as early as 1570, but the disease has spread rapidly during the last few decades with improved communications. Several attempts to found leper hospitals or colonies were made during the nineteenth century, but since 1907 the lepers have been sent to Culion in large numbers. The incidence in the 52 Cebu municipalities varied from 0·4 to 26·4 per mille, the worst areas being within 20 kilometres of the capital town. *L. R.*

DENNEY (O. E.). **The National Leper Home (United States Marine Hospital), Carville, La. Review of the More Important Activities during the Fiscal Year ended June 30, 1931.**—*Public Health Rep.* 1932. Mar. 11. Vol. 47. No. 11. pp. 601–613.

This report for 1931 records an annual increase in the voluntary admissions as the result of the great care the patients receive there ; 63 new cases were admitted bringing the total number to the highest yet recorded, namely 337. The deaths amounted to 23 and 19 were paroled. Treatment continued on former lines and no less than 96 per cent. of 180 on chaulmoogra-oil-benzococaine showed from slight to marked improvement. Three of four patients who received vaccinated calf serum intramuscularly for two years are now bacteriologically free, and all such cases show clinical improvement but " no conclusion of specific effect can be made." With chaulmoogra treatment in both early and advanced cases about 50 per cent. improved, but no change was more frequent in advanced cases. Generalized lepra reactions with fever were not more frequent than might be expected in untreated cases. The activities of the neuropsychiatric, orthopaedic, dental, laboratory, nursing and dietetic services were maintained with good effects, and it is noteworthy that since a number of patients have been paroled " mental depression is now infrequent, while a general state of hopefulness prevails." The work at Carville is to be envied by poorer countries with vastly more lepers to provide for. *L. R.*

HADDAD (E.). Contribution à l'étude de la lèpre au Kasai (Congo Belge) d'après 127 cas observés en pratique itinerante. [**Leprosy in the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 311–313.

This is a brief account of a tour in an area of western Belgian Congo during which 127 lepers were seen among about 5,000 people, of whom 6 per cent. appear to have been infected conjugally, and 42 per cent. by close contact with lepers. The author thinks the true number of lepers is over 10 per cent. in some areas. *L. R.*

TALOTTA (Giuseppe). La lebbra in Eritrea. [**Leprosy in Eritrea.**]—*Arch. Ital. Sci. Med. Colon.* 1932. Apr. 1. Vol. 13. No. 4. pp. 193–199. English summary (6 lines).

With a view to attacking seriously the problem of leprosy in Eritrea a census has been undertaken and so far, in a seven months' investigation, 559 patients have been noted. This figure does not by any means represent all the cases for there is a considerable number of nomads who have evaded examination. After discussion the authorities have decided not to erect a leprosarium, but to found a colony where the patients can be properly housed and attended to. *H. H. S.*

HOFFMANN (W. H.). Lepraheim Spinalonga. [**Leper Home in Spinalonga (Crete).**]—*Dermat. Woch.* 1932. Apr. 2. Vol. 94. No. 14. pp. 477–480.

The author calls attention to the description given by Dr. MEISSEL in the *Muenchener Medizinische Wochenschrift*, 1931, No. 36, p. 1530, of the state of the Leper Home at Spinalonga in Crete, which is so gruesome as to be comparable with Dante's inferno; the colony is considered to be a danger to Eastern Europe. He points out that there is no excuse for such a state of affairs in which the patients do not receive the benefits of the modern treatment of leprosy by injections of pure chaulmoogra oil preparations, by means of which lepers not extremely advanced can be cured in the sense of being rendered free from the symptoms, discomfort and infectivity of the disease, and relapses can be obviated by regular medical supervision. Action should be taken by the Leprosy Commission of the League of Nations to put an end to the discreditable state of affairs at Spinalonga. *L. R.*

BURNET (Et.). La lèpre à la Société des Nations. Nouvelle phase de la lutte contre la lèpre. [**New Phase of the Leprosy Campaign by the League of Nations.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1932. Mar. Vol. 54. No. 3. pp. 161–182.

The author is secretary to the Leprosy Commission of the League of Nations and he here gives a general review of the question based on his experience during his world-wide tours. He points out that the rigid compulsory segregation methods of the middle ages are incompatible with modern ideas, and that modern treatment by chaulmoogra derivatives must now play a great part in the campaign against leprosy. Opinion however still differs widely, from strong support of segregation as the principal measure in Japan, to the Indian system of propaganda-treatment-survey with much reliance on early treatment in out-patient clinics at a minute fraction of the cost of segregation, while in the Philippines compulsory segregation at Culion is now supplemented by treatment hospitals near large towns and skin clinics for early out-patient treatment. In South America and in Hawaii segregation with treatment is mainly relied on. The latter part of the paper deals with the conclusions arrived at by the Conferences at Bangkok in December 1931 and at Culion in January 1931, and the formation of the International Leprosy Society. These have already been recorded in this *Bulletin.* *L. R.*

British Empire Leprosy Relief Association. **The Empire's Open Sore: being the Annual Report for 1931.**—32 pp. With 12 figs. & 1 chart. London: 29 Dorset Square, N.W.1.

Work has been continued on the same lines as before, a general, popular account of which is recorded. Close on 550,000 doses of hydnocarpus preparations were sent out during the year, the highest total so far, at a cost of £900, and a total of £2,410 was expended in grants to seven African tropical areas with the approval of local Directors of Medical Services. The number of lepers in the British Empire is estimated to be 1,250,000. *L. R.*

Austin (C. J.). **Leprosy in Children. (A Study of 100 Cases in the Central Leper Hospital, Makogai, Fiji.)**—*Jl. Trop. Med & Hyg.* 1932. Apr. 15. Vol. 35. No. 8. pp. 113–118.

During 19 years among 1,450 admissions to the Fiji Leper Hospital at Makogai 105 were children under 15 years of age. A study of the records of these cases was made in the hope of finding early cases, and it was found that the proportion of children to adults has steadily increased from 2·72 per cent. in the first five years to 12·32 per cent. in the last few years; an encouraging sign of growing confidence in treatment attracting more early cases. The sexes were about equal, 54 per cent. were neural, 21 cutaneous and 25 of mixed type. Cases were only discharged on parole after being bacteriologically negative for two years, and 2 of the 14 relapsed. No less than 61 of the 105 gave a history of one or more leper relatives numbering from 2 to 19, although fear of their relatives being segregated tended to understatements. "It would be difficult to find a more cogent argument for the necessity of frequent and thorough examinations of family contacts." *L. R.*

Rodriguez (José). **Studies on Early Leprosy in Children of Lepers, II. Re-examination of Cases after Five Years.**—*Philippine Jl. Sci.* 1932. Feb. Vol. 47. No. 2. pp. 245–258.

This is an important account of the re-examination of cases of leprosy in children five years after treatment at the Culion leper settlement. Early attempts to separate the children born at Culion from their leper parents in infancy proved so fatal to the infants that it had to be postponed until they were weaned, so they were only separated at from 6 months to 11 years of age, and observed for four years before being released, with the result that 23 per cent. of 123 so isolated up to 1924 developed leprosy, indicating early infection. After a survey in 1924 children above two years of age, negative bacteriologically, but often with early signs of leprosy, were sent to Manila, and by 1926, 71 out of 289 had died, many of epidemic dysentery, and others were sent to relatives. Improved conditions at Culion now allow of the safe isolation of infants from birth. A 1929 survey of 336 children examined in 1924, whose records could be traced, showed that 50 had been rendered negative and been paroled, 31 were still lepers, 56 had died, 90 were still under observation and 106 had been discharged to the care of relatives or guardians. Of the 90 still under observation 68 were non-lepers, 5 were negative or arrested, 13 had suspicious signs and 4 stationary lesions which had never been positive bacteriologically.

A table showing the number of children who had become positive between 1922 and 1929 showed 24, 22, 16 and 14 in the years 1922 to 1925, but only 2, 3, 2, 2 in 1926 to 1929. The great recent fall is attributed to (1) there being fewer children under observation, (2) intensive treatment of "clinical lepers," (3) transfer of the older children to Manila, and "most important of all, (4) the early segregation of the younger ones in the nursery at Balala." In ten of the 85 cases becoming positive undoubted clinical signs were present three months to four years before the bacilli were found, and in no less than 37 suspicious or definite clinical lesions were present for from a few months to four years before becoming positive, but in 24 typical positive lesions appeared suddenly. In 30 children with suspicious macules these lesions became positive later in 24. Among 51 children with undoubted clinical lesions, but negative bacteriologically, of 20 seen in 1922, eight, or 40 per cent., had become positive by the end of 1924 in the absence of treatment, but of 31 cases seen in 1924 only 2 progressed to the positive stage; a great decrease since 1924 "due largely to antileprotic treatment." On the other hand children with "suspicious" lesions, including pale macules or depigmented patches and also "a characteristic flushed, tense, glistening appearance on the front of either one or both legs of children below the age of 2 years," the "Nicolas sign," later developed definite signs of leprosy in 57 per cent. of 58, but only 12 per cent. out of 206 with no signs whatever developed leprosy later. Moreover, it was found that of 83 "suspicious" cases treated for an average of fourteen months 70 or 84 per cent. remained suspicious while 10 or 12 per cent. became clinical or positive lepers, but it is important to note that they were all living with their leper parents and so continuously exposed to reinfection. On the other hand, of 63 "suspicious" children transferred to Welfareville, away from their parents, and 5 "clinical lepers," in 42 the lesions had subsequently cleared up. It is therefore held that "prophylactic treatment" is useless and unscientific. *L. R.*

Lipschitz (L. A.). La réaction Costa dans la lèpre. **Value of Costa's Reaction in Lepra.**—*Trop. Med. & Vet.* Moscow. 1931. Vol. 9. No. 3. pp. 147–150. [6 refs.] [In Russian. French summary.]

The author used Costa's reaction with the object of ascertaining its value in the diagnosis of leprosy. The cases were divided into three groups: (1) those with slight; (2) with medium; and (3) with grave lesions. Cases in which leprous phenomena were absent were classed as negative. The reaction was positive in 68 out of 100 cases. In the third group over 90 per cent. of cases manifested a marked positive reaction, in the second group the percentage was 75, and in the first 34·7. As regards the influence of the type of disease, positive reactions were relatively rare in the nervous form of leprosy, while the nodular form showed the greatest number of positive results. The reaction was negative in recent cases, becoming positive only after one year. The maximum number of positive reactions was observed in cases of 6–10 years' duration. Treatment diminishes the percentage of positive reactions. Age and sex have no influence upon the degree of reaction. *C. A. Hoare.*

MITRA (P. N.). **A New Method of Diagnosis of Leprosy.**—*Indian Jl. Med.* 1932. Feb. Vol 13. Pt. 1. pp. 1–2.

The author states that when 5–10 cc. of blood were withdrawn from a vein into 1 per cent. sodium citrate in distilled water, and the sediment obtained by centrifuging was smeared on a slide, and thick films stained with Ziehl-Neelson and methylene blue, acid fast bacilli were found in the blood in 21 out of 26 cases of both cutaneous and nerve cases, but not in non-leper controls. *L. R.*

MANALANG (Cristobal). **Significance of Pathologic Findings in Biopsy Materials from Lepers. Preliminary Report.**—*Monthly Bull. Philippine Health Serv.* 1931. Dec. Vol. 11. No. 2. pp. 633–638.

————. **Transmission of Leprosy.**—*Ibid.* pp. 639–640.

In the first of these short notes the microscopical changes are recorded in 33 cases of leprosy. In the second the author states his opinion that the evolution of the disease up to the appearance of clinically recognizable lesions takes many years, during which a non-infective non-acid-fast stage of the lepra bacillus is present. *L. R.*

LOWE (John) & CHRISTIAN (E. B.). **Bacteriological Examination in Leprosy. A Study in the Efficiency of the Various Methods in Common Use.**—*Indian Jl. Med. Res.* 1932. Jan. Vol. 19. No. 3. pp. 867–872. With 7 figs. on 2 plates.

As the result of the examination of 160 cases these workers conclude that nasal examination showed the bacilli in only the number of cases that skin examination showed them, and nasal scraping was more efficient than smears. Skin examination by either the split or clip method is far better than nasal examination, but most positive results were obtained by the clip method in the lobe of the ear, and only four cases showed bacilli elsewhere and not in the ear lobe.

L. R.

MOTTA (Joaquim). Lepra tuberculoide. [**Tuberculoid Leprosy.**]—*Folha Med.* 1932. Jan. 25. Vol. 13. No. 3. pp. 25–30. With 4 text figs.

Descriptions are given of the various forms which this condition may present; sometimes with well defined reddish edges, with little infiltration, slight branny desquamation, the lesions often no larger individually than a pin's head but at times becoming confluent or gathered in patches though remaining discrete; some closely resemble the lesions caused by Trichophyta, others are like lupus. They differ from the usual leproma in containing bacilli in small numbers only, this difference being ascribed to varying degrees of allergy, the "tuberculoid reaction" being produced when the organisms are gradually autolysed by the action of antibodies, i.e. when there exists a certain degree of immunity. The paper is illustrated by photographs demonstrating the commoner forms of the lesion. *H. H. S.*

Rabello, Jr. [In Portuguese & English] Eritema polimorfo e patologia da lepra : lesão inicial, alergia, surtos agudos. **On Erythema Exs. Multiforme and the Pathology of Leprosy. Primary Lesion, Allergy, Acute Exanthemata.**—*Rev. Med.-Cirurg. do Brasil.* 1931. Dec. Vol. 39. No. 12. In Portuguese pp. 405–420. In English pp. 420–434.

This is mainly a summary of the literature on this much discussed subject from which the author concludes that the appearance of new Erythema multiforme lesions in the course of leprosy is an allergic phenomenon and a good prognostic sign, although some think otherwise. *L. R.*

Roy (Ashutosh). **Relapse of Active Signs in "Burnt-out" Cases of Leprosy.**—*Indian Med. Gaz.* 1932. Jan. Vol. 67. No. 1. pp. 12–13.

The author records four cases out of over 300 classed as "burnt-out," or arrested, cases in the large Purulia Leper Colony in India in whom the disease recurred, in each instance, following surgical operations. *L. R.*

Dubois (A.). La cuti-réaction à la tuberculine chez les lepreux. (Note préliminaire.) [**The von Pirquet Reaction in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Mar. 31. Vol. 12. No. 1. pp. 1–4.

The author has studied this reaction in both lepers and in non-lepers in the Belgian Congo by von Pirquet's method, but he did not find that the former gave more reactions than the latter, for 126 of 551 lepers, or 22·8 per cent. reacted, against 657 of 3,041 non-lepers, or 21·6 per cent. He concludes that a positive tuberculin reaction in a leper is indicative of tubercular complication. *L. R.*

Chiyuto (Sulpicio) & Velasco (Felix). **Observation of Seven Hundred Fifty-Eight Quiescent, or Arrested, Cases of Leprosy Released from Isolation.**—*Jl. Philippine Islands Med. Assoc.* 1931. Dec. Vol. 11. No. 12. pp. 457–468. [6 refs.]

This is an important study of 758 cases of quiescent or arrested cases of leprosy released from isolation in Manila and the neighbouring provinces from 1922 to 1930. Many could not be traced but the 78.5 per cent. followed up was higher than expected under the difficult conditions of work. Table 3 below shows the results in those followed up successfully ; 66·9 remained quiescent and 33·1 per cent. had become active again, while another table shows that of 735 cutaneous cases 542 remained quiescent, and of 23 neural ones 21 showed no recurrence of active signs. Length of treatment during isolation did not appear to affect the results, but preparations made from *Hydnocarpus wightiana* oil gave better results than the earlier used *Taraxtogenus kurzii* oil, with 65·8 per cent. of relapses with the true chaulmoogra oil and only 45·1 per cent. with the hydnocarpus oil. They conclude that the average number of relapses varies between 32·9 per cent. and 46·4 per cent. according to the frequency with which the lepers continue regular treatment and their conditions of living. The

TABLE 3.—Showing the Frequency of Cases becoming Active and remaining Quiescent among those Released from Isolation.

Period of observation.	Total or average.			
	Number		Percentage	
	Active	Quiescent	Active	Quiescent
Less than 1 year	33	125	20·8	79·2
1 year to 2 years	43	140	23·5	76·5
2 years to 3 years ...	44	61	41·9	58·1
3 ,, 4 ,, ...	26	31	54·4	45·6
4 ,, 5 ,, ...	22	18	55·0	45·0
5 ,, 6 ,, ...	14	10	58·3	41·7
6 ,, 7 ,, ...	10	7	58·8	41·2
7 ,, 8 ,, ...	3	5	37·5	62·5
Over 8 years	0	0	0	0
Total or Average ...	195	397	33·1	66·9

percentage of relapses increases with the length of parole after release. An agricultural colony for released cases is advocated to allow of continued treatment and observation. *L. R.*

DIKSHIT (B. B.). **Alepol in Leprosy.**—*Indian Med. Gaz.* 1932. Jan. Vol. 67. No. 1. pp. 7–12. With 2 graphs in text.

The author is professor of pharmacology and he has tested the use of Rogers' alepol (sodium hydnocarpate of B. W. & Co.) in place of the whole oil or ethyl esters in the same manner as MUIR uses the latter. Alepol has a less local irritant effect than other salts of hydnocarpus oil and its haemolytic action may be diminished by dissolving it in Locke's solution. The treatment was controlled by sedimentation tests. His conclusions are :—

" (1) Alepol, a soap derived from the lower-melting-point fatty acids of the hydnocarpus oil, was used in the treatment of 200 cases of leprosy.

" (2) The drug is given by intramuscular injections in the beginning and later by intravenous injections. The strength for the former is 3 per cent. and that for the latter 1 and 2 per cent. For intravenous injections Locke's solution without glucose is used to dissolve the drug, instead of distilled water.

" (3) Improvement is seen most in A_1 and $A_1 B_1$ types. B cases become stationary and improve very gradually. They become bacteriologically negative after a few months' treatment.

" (4) The Wassermann reaction was positive in 70 per cent. of the cases, and more than 70 per cent. of the cases were infected with leprosy before the age of 40.

" (5) The clinical results obtained with Alepol compare favourably with those contained with hydnocarpus oil." *L. R.*

PEIRIER (M.). Injections intraveineuses de chaulmoograte de soude. [**Sodium Chaulmoograte for Intravenous Administration.**]—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.–Nov.–Dec. Vol. 29. No. 4. pp. 852–860.

The preparation used consists of the soaps of the whole of the fatty acids of the oil, so it contains much sodium hydnocarpate.

Various difficulties were met with in preparing an isotonic and unirritating solution, a description of which makes up most of the paper, with the result that the following prescription was eventually adopted for intravenous injections.

Chaulmoograte of Soda three parts saturated ...	10	grams.
Saccharose	47	do.
Antipyrine	25	do.
Distilled water add to	1,000	cc.

L.R.

Muir (E.). **The Intradermal Method of injecting Hydnocarpus Preparations in Leprosy.**—*Indian Med. Gaz.* 1932. Mar. Vol. 67. No. 3. pp. 121–124. With 3 text figs.

The greater activity of intradermal than of intramuscular injections is emphasized and the ethyl esters are preferred for the former method as they are less quickly absorbed. Illustrations are given of the effects of the ethyl ester on one side and of 3 per cent. sodium hydnocarpate on the other in support of this opinion. The esters mixed with 4 per cent. creosote proved least irritating on intradermal injection. A practised worker is said to be able to give some 100 punctures in a couple of minutes with infiltration of 5 to 6 cc. in an area of 14 square centimetres in half minim doses at each point. *L. R.*

Cole (Howard Irving). **Causes of Irritation upon Injection of Iodized Ethyl Esters of Hydnocarpus-Group Oils.**—*Philippine Jl. Sci.* 1931. Nov. Vol. 46. No. 3. pp. 377–382.

The author is chief chemist at Culion and he has carried out careful experiments to ascertain the best way to make ethyl ester hydnocarpates that will be as unirritating as possible on intramuscular injection. He found that a low pan type of vessel is preferable to a high one for iodization, occasional stirring is advisable during the process and that sunlight or heat in the presence of air soon changes the iodized esters into an extremely irritating product. *L. R.*

Paldrock (A.). Zur Behandlung der Lepra mit Fuadin, Neostibosan und R 103. [**Leprosy treated with Fuadin, Neostibosan and R 103.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Mar. Vol. 36. No. 3. pp. 135–140.

The author reports on 12 cases of leprosy treated by what he regards as his "specific" method by local application of carbonic acid snow, with the addition of one of the antimony preparations or a gold preparation of Dr. A. W. Collier known as R 103. On treating fixed preparations of leprous nodules with $\frac{1}{4}$ per cent. solutions of these three drugs he found that after three hours the lepra bacilli had become Gram negative, and this he regarded as indicating that they should be of great value in the treatment of leprosy. Unfortunately his trials of them combined with CO_2 treatment and daily radiation with cold red light, and controlled by the sedimentation test, showed

only slight improvement in half of six cases in which R 103 was used, and his general conclusion is that the results of these three "unspecific" drug treatments could not be looked on as favourable.

L. R.

Cruz (M. C.), Abuel (Jose I.) & Samson (José G.). **Periarterial Sympathectomy in Trophic Ulcers of Leprosy: Preliminary Report.**—*Jl. Philippine Islands Med. Assoc.* 1931. Dec. Vol. 11. No. 12. pp. 474–476.

Thirteen cases are reported of the performance of this operation in the femoral region for perforating ulcers, with the immediate good effect of healing of the ulcers on the side operated on in 10 to 30 days; but in 8 the ulceration recurred in 10 to 75 days. *L. R.*

i. McKinley (Earl B.) & Soule (Malcolm H.). **Studies on Leprosy. Experimental Lesions in Monkeys and Cultivation of** *Bacillus leprae*.—*Jl. Amer. Med. Assoc.* 1932. Jan. 30. Vol. 98. No. 5. pp. 361–367. With 6 text figs. [12 refs.]

ii. Soule (Malcolm H.) & McKinley (Earl B.). **Cultivation of** *B. leprae* **with Experimental Lesions in Monkeys.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 1–36. With 13 text figs. and 4 coloured figs. on 3 plates. [24 refs.]

This is a careful study of a difficult question. After brief references to the cultivation of diphtheroids and acid-fast chromogenic bacilli from leprous material by 22 previous workers, and to attempts to infect animals, with occasional apparent success in the case of monkeys, they describe their work at Porto Rico in the inoculation of eight young *Macaca rhesus* and five *Cebus olivaceus* monkeys intradermally with 0·25 gm. of an emulsion in normal saline of freshly removed leprous nodules. In three of the first and in all five of the second species nodular lesions developed at the site of inoculation in 18 to 20 days, and granulation tissue with acid-fast bacilli was found in one nodule removed after ulceration had occurred. After increasing in size for a week or two the lesions regressed and disappeared in another three to four weeks, as was found by Reenstierna.

They also report attempts to cultivate *Myco. leprae* from freshly removed nodules implanted on various media and kept in various gaseous atmospheres, with occasional positive results, which were never uniform under any one set of conditions. The best results were obtained with glycerol potato, egg containing and hormone glycerol agar mediums, and the most favourable gaseous environment seemed to be 40 per cent. O_2 plus 10 per cent. CO_2, but only negative results were obtained under anaerobic conditions plus CO_2. These results confirm those of Shiga and Wherry obtained recently. The growth from 16 tubes was suspended in normal saline and inoculated into monkeys with the production of small granulomatous nodules in 10 out of 17 animals, but with early disappearance of the bacilli from the tissues. They discuss the possibility of the lesions being produced by the toxins of dead bacilli. *L. R.*

Oliver (Wade W.), de Leon (Walfrido) & de Roda (Alfredo Pio). **The Attempted Cultivation of** *Mycobacterium leprae.*—*Philippine Jl. Sci.* 1931. Dec. Vol. 46. No. 4. pp. 611–625. With 2 figs. on 1 plate.

The authors have repeated but with entirely negative results, the work of Wherry and of Shiga, which led them to claim to have cultivated the leprosy bacillus [see this *Bulletin*, Vol. 27, p. 339, Vol. 28, p. 332]. They obtained persistence of the organisms up to 158 days in one instance in an original partial oxygen tension culture on 4 per cent. glycerine chicken bouillon sweet potato, but no multiplication could be shown in either primary or secondary cultures. The shortest persistence was from 14 to 43 days. *L. R.*

Eichbaum (Franz). Erfahrungen und Beobachtungen an säurefesten Stäbchen (Wasserbakterien, Leprabazillen, Tuberkelbazillen). [**On Acid Fast Bacilli.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 1/2. pp. 31–55. [57 refs.]

Recent work by Shiga and others has enabled a certain degree of multiplication of the leprosy bacillus on artificial media to be obtained, but subculture through several generations has not yet been achieved. After discussing the recent literature the author records that after trying 50 culture media he obtained the best results with a potato one, on which he satisfied himself that a certain amount of multiplication occurred on the first two passages and perhaps for a third. When the bacilli become scarcer in subcultures they are only carried over mechanically. *L. R.*

Vaudremer (A.), Sézary (A.) & Brun (C.). Culture de germes provenant de lépromes et de rate lépreuse filtrée. [**Cultivation of Organisms from Leprotic Tissue.**]—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. pp. 624–626.

The authors report four years' work on the cultivation of the lepra bacillus in a filtrate of a culture of *Aspergillus fumigatus* to which was added a piece of removed leprous tissue as recorded in a previous paper. They now report similar growth from a filtrate of a leprous spleen passed through a bougie L3 inoculated into bouillon, potato, glycerine potato and on ordinary gelatine; after being apparently sterile for nine months Gram staining pseudo-meningococcus appeared, and these developed first into cyanophile bacilli and later into acid-fast bacilli, which they regard as the bacillus of Hansen grown from an element which will pass through bougie L3. *L. R.*

Cantacuzène (J.) & Longhin (S.). De l'existence d'un ultra-virus chez le bacille de la lèpre humaine. [**A Filtrable Stage of** *Mycobacterium leprae.*]—*C. R. Soc. Biol.* 1932. Apr. 13. Vol. 109. No. 11. pp. 1003–1004.

The authors report that they have proved the existence of an ultra-virus stage of the lepra bacillus through animal inoculations.

An emulsion of lepra bacilli from a nodule was passed through a L3 bougie and inoculated into the peritoneal cavity of six white rats, and in two of them killed after two months, in macroscopical lesions on the peritoneum acid-fast bacilli were demonstrated. *L. R.*

Ota (M.) & Sato (S.). Reproduction de la lèpre chez les rats blancs par l'inoculation de lépromes en émulsion. [**Inoculation of Leproma Emulsions into White Rats.**]—*C. R. Soc. Biol.* 1932. Jan. 22. Vol. 109. No. 2. pp. 75–77. With 1 text fig.

These authors report on the inoculation of white rats with acid-fast bacilli grown from leprous nodules inseminated on the media of Petragnami or of Löwenstein for a month, during which the organisms were found to have multiplied remarkably. The rats after inoculation were fed on a diet deficient in vitamin B, and in two out of seven small nodules appeared on the cheek and nose and increased to the size of peas with the development in them of numerous acid-fast bacilli, while in one ulceration of the nose was produced. *L. R.*

Cilento (R. W.) & North (E. A.). **Human and Murine Leprosy in Tropical Australia: Preliminary Notes and Observations.**—*Med. Jl. Australia.* 1931. Dec. 19. 18th Year. Vol. 2. No. 25. pp. 767–775. [21 refs.]

After references to earlier work on rat leprosy in Australia and elsewhere, the authors record that experimental work at Rockhampton in Queensland furnished no convincing evidence of a connexion between human and rat leprosy. Emulsions of excised rat leprosy nodules were injected into forty young male white rats and in a number of them lesions containing acid-fast bacilli were produced by both intraperitoneal and subcutaneous injections. Cultures were also made from rat leprosy material, but in one instance only was an acid-fast bacillus obtained in both primary and secondary culture tubes of Dorset egg medium, with which typical lesions were produced in six young rats inoculated with a subculture. Other rats were inoculated intraperitoneally with emulsions of human leprosy nodules transported packed in ice, but with negative results. *L. R.*

Koch (Franz). Die Rattenlepra und ihre Bedeutung für Klinik, Pathogenese und Therapie der menschlichen Lepra. [**Rat Leprosy and its Significance for the Disease in Man.**]—Reprinted from *Zent. f. Haut- u. Geschlechtskrankh.* 1932. Vol. 40. pp. 433–444. [1 page of refs.]

This paper consists mainly of a good account of the literature of rat leprosy. The author thinks some negative results of inoculation experiments were due to the incubation period often being very long. He notes that several workers obtained apparent cures of rat leprosy following breaking down of the nodules under chaulmoogra treatment. He has tried treating white rats infected by inoculation into the right groin of portion of leprous granulomata from wild rats with

subcutaneous injections of hydnocarpus esters, with breaking down of nodules after eight days treatment, but after stopping the treatment the disease spread again, and the same happened after solganal B treatment. He thinks these animals will be of value in testing drugs for use in human leprosy. *L. R.*

Ohtawara (T.) & Ichihara (T.). Studium der Lepra. I. Mitteilung. Statistische Betrachtung der Rattenlepra. [**Studies in Leprosy. I. Statistics of Rat Leprosy.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Feb. 3. Vol. 123. No. 7/8. pp. 495–503. [27 refs.]

After references to literature on the subject of rat leprosy, these workers record their investigations in Japan in a series of tables. From these they conclude that 281, or 27·9 per cent., of 1,007 rats caught in Kumanoto were affected by this disease, mostly full grown animals, although they are often infected in their youth. The rat leprosy bacillus resembles that of the human disease. Both sexes are equally attacked. The disease was most frequent in rats caught in grain stores, and those of greengrocers and other similar traders, so they think the germs are most likely to be transmitted through grain and vegetables or from the earth. *L. R.*

Wooley (Jerald G.) & Ross (Hilary). **Calcium, Phosphorus, and Protein Metabolism in Leprosy. A Study of the Total Calcium, Diffusible and Nondiffusible Calcium, Phosphorus, Total Proteins, Albumin, and Globulin in the Blood Serum.**—*Public Health Rep.* 1932. Feb. 12. Vol. 47. No. 7. pp. 380–389. [12 refs.]

The authors compare the results of their chemical analyses of the sera of six healthy young men with those of 46 lepers in various stages of the disease. They conclude that in leprosy " The albumin-globulin ratio and the diffusible calcium, as well as the percentage of diffusible calcium, averaged considerably lower in the lepers than in the normal young men ; the globulins and non-diffusible calcium averaged higher than in the controls. Three cases showed normal values throughout all determinations as compared with old controls." *L. R.*

Uyei (Nao) & Anderson (R. J.). **The Chemistry of the Lipoids of Tubercle Bacilli. XXVI. Separation of the Lipoid Fractions from the Leprosy Bacillus.**—*Jl. Biol. Chem.* 1932. Jan. Vol. 94. No. 3. pp. 653–660. [14 refs.]

The authors have applied the chemical methods used by them in work on the tubercle bacillus to a large quantity of material derived from 3,000 cultures of an acid-fast bacillus originally isolated from a case of human leprosy in Honolulu about 1909, and known as the Hygienic Laboratory strain No. 370 (Apa case) of *Mycobacterium leprae,* and which they regard as the causative organism of leprosy. Their results are well shown in the following table in contrast with a similar examination of tubercle bacilli.

Substances isolated from Bacillus leprae.

	Bacillus leprae 3,000 cultures		Human tubercle bacillus, Strain H-37 2,000 cultures	
	gm.	*per cent.*	*gm.*	*per cent.*
Phosphatide	100·5	2·25	253·1	6·54
Acetone-soluble fat ...	289·5	6·47	240·0	6·20
Chloroform-soluble wax...	444·8	9·98	427·0	11·03
Total lipoids	834·6	18·70	920·1	23·78
Polysaccharide	41·2	0·92	33·9	0·87
Dry bacillary residue ...	3389·8	80·38	2902·0	75·01
Dry bacterial matter per culture...	1·488	—	1·928	—

L. R.

Sanjurjo (D.) & Sanjurjo (Marguerite). La réaction de Vernes chez quelques lépreux et quelques témoins. [**The Vernes Reaction in Lepers and Others.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 127–128.

The authors report finding serum flocculation in 24 out of 36 lepers and in only 35 per cent. of non-lepers' serums sent for tests, including syphilitics. *L. R.*

Leger (Marcel). Séroflocculation au péréthynol chez les lépreux. [**Sero-flocculation with Perethynol in Lepers.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 128–129.

The author refers to the above work and he points out that he had found that Vernes' sero-flocculation with perethynol gave a normal photometric index in non-syphilitic lepers, and resorcine gave negative results with non-tubercular lepers ; contrary to the results of Margaret Sanjurjo in Asuncion. He attributes these to the very high rate of syphilitic infections in Asuncion. *L. R.*

Ambrogio (Agostino). La reazione di Rubino nella lepra. [**The Rubino Test in Leprosy.**]—*Pathologica.* 1932. Apr. 15. Vol. 24. No. 486. pp. 258–268. [19 refs.] English summary.

The authors conclude that the Rubino test has some value, but is not a sure test for the presence of leprosy. *L. R.*

Rao (G. R.) & Roy (A. T.). **'Mercurochrome 220 Soluble' in Leprosy Work.**—*Indian Med. Gaz.* 1932. Mar. Vol. 67. No. 3. pp. 124–128. With 2 charts in text.

The title of this paper is a misnomer as the 12 cases included 3 of sepsis, 3 *Bact. coli* infections and the rest arthritis, neuritis and vague pains in lepers. A certain amount of benefit was observed in some of the patients after the treatment with the mercurochrome. *L. R.*

Delamare (G.) & Gaona (R. Jimenez). Lèpre et acromégalie.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Mar. 7. 48th Year. 3rd Ser. No. 8. pp. 267–270.

Delamare (G.) & Gaona (R. Jimenez). Lignes rouges et lignes blanches, réactions nulles des lépreux.—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 200–204.

Hoffmann (W. H.). O tratamento precoce da lepra.—Distribuçâo da Sociedade de Assistencia aos Lazaros e Defesa contra a Lepra. 1931. São Paulo. 9 pp.

Laquièze (E.). Un cas de lèpre.—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 123–124.

Markianos (J.). Les verrues vulgaires des lépreux.—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 302–303.

Morrow (Howard). Personal Experiences with Leprosy.—*Southern Med. Jl.* 1932. Feb. Vol. 25. No. 2. pp. 158–162. [18 refs.]

Mottat (Joaquim). Les sarcoides de la lèpre.—*Ann. Dermat. et Syph.* 1931. Nov. 7th Ser. Vol. 2. No. 11. pp. 1180–1187. With 3 figs.

Tisseuil (J.). Contribution à l'étude des tuberculoïdes de la lèpre. Stade tuberculoïde inachevé.—*Bull. Soc. Path. Exot.* 1931. Dec. 9. Vol. 24. No. 10. pp. 898–902.

Tisseuil (J.). Observation d'un sujet réfractaire à la lèpre, mort de cancer.—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 124–127.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Atkey (O. P. H.). La fièvre récurrente au Soudan en 1930. [**Relapsing Fever in the (Anglo-Egyptian) Sudan in 1930.**]—*Bull. Office Internat. d'Hyg. Publique.* 1931. Nov. Vol. 23. No. 11. pp. 2000–2006.

Isolated cases of louse-transmitted relapsing fever occurred in the Blue Nile Province from April onwards, and during the last four months of the year in the irrigated region of Gezirah, 379 cases were recorded from among the immigrants from the west. The mortality was 11·9 per cent. compared with 60 to 80 per cent. in the Darfur epidemic four years previously. [The author suggests a diminution in the virulence of the disease, but the possibility of different social conditions, nutrition, etc., cannot be ignored.] A very striking difference was observed between this recent epidemic and the Darfur outbreak in the number of spirochaetes in the blood. In the Darfur epidemic the parasites were only found during the first or second day of the febrile attack, and even then were rare, whilst in this recent epidemic spirochaetes were easily found even among contacts showing no symptoms of infection. Particulars are given of the administrative measures taken to combat the spread of these epidemics. In addition to the main epidemic in the irrigated regions, cases also occurred in other parts of the Blue Nile, and in the provinces of Darfur, Kordofan, Khartoum and the White Nile. *E. Hindle.*

Syssine (A.). La fièvre récurrente dans l'Union des Républiques Soviétistes socialistes de 1925 à 1930. [**Relapsing Fever in U.S.S.R. from 1925–1930.**]—*Bull. Office Internat. d'Hyg. Publique.* 1931. Nov. Vol. 23. No. 11. pp. 1998–1999.

The disease seems to have shown a steady diminution from a total of 19,701 cases in 1925 to only 1,656 in 1930. In addition to the louse-transmitted relapsing fever a few cases of the tick-transmitted variety have been recorded from Central Asia. *E. H.*

Varden (Arthur E.). **Relapsing Fever. Report of Case.**—*California & Western Med.* 1932. May. Vol. 36. No. 5. pp. 344–346.

A report of the clinical history and pathological examination of a case of relapsing fever in a 5½ year old child in Big Bear Valley, Southern California, who became ill shortly after arriving at the Valley from Tucson, Arizona. Spirochaetes were found in later relapses. *E. H.*

Mathis (C.) & Durieux (C.). Identité, à Dakar, de *Spirochaeta duttoni* var. *crocidurae* et du spirochète infectant dans la nature *Ornithodorus erraticus*. [**The Identity at Dakar, of** *S. duttoni* **var.** *crocidurae* **and the Spirochaete found in Naturally Infected** *O. erraticus*.]—*C. R. Acad. Sci.* 1932. Mar. 21. Vol. 194. No. 12. pp. 1107–1109.

The authors have compared a strain of relapsing fever obtained from *Ornithodorus erraticus* found naturally infected at Dakar, with two strains from human cases of the disease, and a strain obtained

from a naturally infected shrew-mouse. Cross-immunity experiments were made with these various strains which, although showing minor differences, confirmed the view that *O. erraticus* is the transmitting host of the human relapsing fever occurring at Dakar. *E. H.*

NICOLLE (Charles) & ANDERSON (Charles). Nouvelle preuve de la spécificité individuelle des spirochètes de la fièvre récurrente hispano-africaine. [**New Proofs of the Individual Specificity of the Spirochaetes of Spanish-African Relapsing Fever.**]—*C. R. Acad. Sci.* 1932. May 9. Vol. 194. No. 19. pp. 1618–1620.

The authors' views on this subject have been criticized by DELANOË on the grounds that too large doses of spirochaetes were used in their cross-immunity tests. Accordingly they have repeated cross-immunity experiments with each of four races of spirochaetes isolated from four cases of Spanish-African relapsing fever. With each race some of the animals were infected through the conjunctiva, and others subcutaneously. The results of cross-immunity tests, using different doses and methods of infection, show that the dosage is of no significance, and the races of spirochaetes isolated from different individuals showing the same type of disease, can all be distinguished from each other by cross-immunity tests, as well as by agglutination or lysis tests. *E. H.*

NICOLLE (Charles) & ANDERSON (Charles). Sensibilité du porc aux souches africaines de *Spirochaeta hispanicum*. [**Susceptibility of the Pig to African Strains of** *S. hispanica*.]—*C. R. Acad. Sci.* 1932. Jan. 25. Vol. 194. No. 4. pp. 333–335.

Three young pigs inoculated respectively with relapsing fever from three separate sources in North Africa, all became infected, as determined by subinoculations into other animals made after 32 days. None of the three showed any clinical symptoms of the infection, and spirochaetes were never found in the circulation. Although susceptible, the authors consider the infection in pigs too slight for this animal to be considered of importance as a natural reservoir of the virus. *E. H.*

DELANOË (P.). Contribution à l'étude du pouvoir pathogène du spirochète marocain, *Sp. hispanicum* var. *marocanum* Ch. Nicolle et Ch. Anderson 1928. [**Pathogenicity of the Moroccan Spirochaete,** *S. hispanica* **var.** *marocana*.]—*Arch. Inst. Pasteur de Tunis.* 1931. Dec. Vol. 20. No. 3. pp. 274–282.

Three foxes were infected, two by the inoculation of infected blood and the other by the bites of *Ornithodorus* Weasels were also infected, the young being more susceptible than older animals. Similar results were observed in rabbits. Four newly-born kittens were also infected by the inoculation of blood containing spirochaetes. They all recovered and neither rabbits nor the kittens showed any residual infection of the central nervous system. *E. H.*

DELANOË (P.). Le réservoir de virus du spirochète marocain, *Sp. hispanicum* S. de Buen, var. *marocanum* Ch. Nicolle et Ch. Anderson 1928. [**The Reservoir of the Virus of** *S. hispanica* **var.** *marocana*.]—*Arch. Inst. Pasteur de Tunis.* 1931. Dec. Vol. 20. No. 3. pp. 286–314.

The author gives details of the examination of large numbers of wild animals in Morocco with the object of determining which species may serve as a reservoir for this spirochaete. In addition to various rodents, carnivores and insectivores have been shown capable of harbouring the virus ; and it is evident that the infection is very widespread in nature and there is no likelihood of its being eradicated. Consequently, to reduce the chance of infection, simple hygienic measures are recommended, such as avoiding the neighbourhood of burrows or pig farms which may harbour infected Ornithodorus. Also when hunting, riding-boots should be worn as a protection against the bites of these ticks. *E. H.*

NICOLLE (Charles), ANDERSON (Charles) & LAIGRET (Jean). Etude des spirochètes des trois premiers cas de fièvre récurrente hispano-africaine, rencontrés en Tunisie. [**A Study of the Spirochaetes from the First Three Cases of the Spanish-African Relapsing Fever occurring in Tunis.**]—*C. R. Acad. Sci.* 1931. Dec. 28. Vol. 193. No. 26. pp. 1370–1371.

The strains of *S. hispanica* isolated from these three cases Z, B and R, were studied for pathogenicity to various laboratory animals, cross immunity and methods of transmission. Recovery from infection with any of these three strains was followed by immunity only against the same virus, and not against spirochaetes belonging to different groups (*S. duttoni*, *S. normandi*), or the same group (*S. hispanica*), even though occurring in the same locality. The authors' results confirm their view that there are no distinct species of relapsing fever spirochaetes but only groups. *E. H.*

ANDERSON (Charles). Complément à l'étude du pouvoir pathogène du virus de Sidi Salem. Sensibilité du renard et du chacal. [**Pathogenicity of the Sidi Salem Virus. Susceptibility of the Fox and Jackal.**]—*Arch. Inst. Pasteur de Tunis.* 1931. Dec. Vol. 20. No. 3. pp. 315–316.

This article is supplementary to the author's study of a strain of Spanish relapsing fever found in Tunis [see this *Bulletin*, Vol. 28, p. 731]. A young fox and a young jackal were inoculated with infected blood and although examined daily for a month neither showed any visible spirochaetes in the circulation ; subinoculations into guineapigs made a week after the inoculation both resulted in these animals becoming infected. *E. H.*

DELANOË (Paul). Au sujet des échecs de transmission du spirochète marocain par des ornithodores adultes (*O. erraticus* L.), non infectants d'emblée. [**Failures in the Transmission of the Moroccan Spirochaete by Adult** *O. erraticus*.]—*Arch. Inst. Pasteur de Tunis.* 1931. Dec. Vol. 20. No. 3. pp. 283–285.

The author gives two examples of unsuccessful attempts to infect adult Ornithodorus with the Moroccan strain of relapsing fever,

confirming NICOLLE and ANDERSON'S previous observations on this subject. Moreover, the larvae hatched from eggs laid by these ticks were also not infected. Yet it is well known that adult Ornithodorus caught in the burrows of wild rodents, are not infrequently infective. Up to the present there is no satisfactory explanation of this discrepancy. *E. H.*

DURIEUX (C.). Cas de fièvre récurrente observés à Dakar et dans ses environs.—Decouverte de l'ornithodore agent de transmission de l'infection. [**Cases of Relapsing Fever observed in and near Dakar. Discovery of the Transmitting Agent Ornithodorus.**]—*Bull. Soc. Path. Exot.* 1932. Jan. 13. Vol. 25. No. 1. pp. 13–18.

During several years many attempts have been made to find the tick responsible for the transmission of the local strain of *S. duttoni* but without success. The author has recently succeeded in finding large numbers of *Ornithodorus erraticus* var. *marocanus* in the burrows of rats in a military camp at Ouakam, near Dakar, as well as a single specimen in Dakar itself. Both the ticks found at Ouakam as well as those from Gorée [see this *Bulletin*, Vol. 29, p. 206] were found to be naturally infected with spirochaetes, and in mice regularly produced infection 5 days after feeding on them. There seems no doubt that this tick is responsible for the cases of relapsing fever occurring in this district. *E. H.*

FEYTE (R.). Le diagnostic de surprise de la fièvre récurrente à tiques. [**The Unexpected Diagnosis of Tick Relapsing Fever.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 368–372.

Details are given of six cases of relapsing fever in Dakar, probably caused by Ornithodorus, which has been found in the burrows of rats. All these cases were diagnosed by finding spirochaetes in blood films, and from the variety of symptoms the author concludes that it would have been impossible to make a clinical diagnosis of the infection. He is of the opinion that the disease is probably much more common in Dakar than the number of recorded cases would lead one to suppose, and that in all febrile conditions it is essential to examine blood films. *E. H.*

LAIGRET (J.) & FRIED (E.). Un cas tunisien de fièvre récurrente hispano-africaine. [**A Case of Spanish African Relapsing Fever in Tunis.**]—*Tunisie Méd.* 1932. Feb. Vol. 26. No. 2. pp. 73–75.

The record of a typical case of the Spanish type of relapsing fever in a native who had always lived in Tunis, thus confirming the presence of this disease in North Africa, in regions where *Ornithodorus erraticus* is found.

E. H.

EBERSON (Frederick) & MOSSMAN (William G.). *Spirocheta hispanicum* **(Variety Marocanum). Application in Fever Therapy and Diseases of Central Nervous System.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Oct. Vol. 29. No. 1. pp. 108–111.

The title of this paper is somewhat misleading as it contains no description of any cases of its application in fever therapy, but is

concerned with methods of cultivation and the life cycle of the spirochaete.

The best growth was obtained in hormone broth containing brain mash, prepared as follows :—1,000 gm. of fresh beef (or sheep) brain were boiled with 1,000 cc. of veal infusion, pH 8·0. The material was passed through a fine meat grinder, 0·2 per cent. glucose added, then tubed and autoclaved at 15 pounds for 15 minutes. After 7 to 10 days incubation at 38°C. spirochaetes were found in great numbers. Transplants were usually made every 7 days. In addition the organisms were grown in media containing one part minced brain tissue, one part isotonic dextrose (5·4 per cent. dextrose in water), one part isotonic sodium citrate (3·8 per cent. sodium citrate in water) and one part of whole blood.

The spirochaetes were found to have a marked predilection for the brain tissue and also inoculated guineapigs showed heavy brain infections. Cultures were found to contain virulent spirochaetes after 2 months incubation at 38°C.

The authors state that their observations of hanging drop preparations lead them to believe that *S. hispanica* develops in accordance with a definite life cycle in the red blood corpuscle passing from a granular stage to that of the adult spirochaetal form. Further studies are said to be in progress, including cinematographic records of the entire life-cycle of this organism. *E. H.*

Marchoux (E.) & Chorine (V.). Culture de formes invisibles du spirochète des poules. [**Cultivation of an Invisible Stage of the Fowl Spirochaete.**]—*C. R. Acad. Sci.* 1932. Mar 7. Vol. 194. No. 10. pp 917–918.

The authors have shown previously that the blood of fowls bitten by *Argas persicus* containing the fowl spirochaete, may become infective before visible spirochaetes can be found in the blood [see this *Bulletin*, Vol. 27, p. 701]. All attempts to culture spirochaetes from this infective blood failed to show any visible signs of these organisms in spite of dark ground illumination and various staining methods. Recently, however, the authors inoculated the contents of some of these microscopically negative tubes into young chicks, which became infected showing spirochaetes in their blood. The ultramicroscopic stage of the fowl spirochaete does not pass through a Chamberland filter and seems to be present in the serum, as washed blood cells failed to produce either infection or immunity. There is said to be no doubt as to the cultivation of this ultra-microscopic stage, for the cultures of later passages were found to be more virulent than the earlier ones. *E. H.*

Kleine (F. K.) & Krause (Magdalene). Zur Kritik angeblicher Entwicklungsformen von Rückfallfieber-spirochäten in der Zecke (*Ornithodorus moubata*). [**The Question of Development Forms of Relapsing Fever Spirochaetes in the Tick** (*O. moubata*).]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 190–191.

The authors fed 47 " clean " ticks on a mouse infected with *S duttoni* and each day, for 33 successive days, killed and examined one of these ticks. Only in three ticks were spirochaetes not found, but in each case a second tick was examined and found to be positive.

In a second experiment ticks were fed on an infected mouse and from the 3rd to the 8th day after the meal, 6 ticks were killed on each day and their contents inoculated into mice. Only one out of 12 mice inoculated failed to become infected. The authors, therefore, obtained no evidence in support of the existence of any developmental stages in the tick analogous to the development of Plasmodium or Trypanosoma in the intermediate host, in which a negative phase occurs and the inoculation of the contents of this transmitting host into the vertebrate host fails to produce infection. *E. H.*

Constantinesco (N.). Culture cellulaire et virus récurrentiel (*Spirochaeta duttoni*, souche Brazzaville). [**The Tissue Culture of Relapsing Fever Spirochaetes.**]—*C. R. Soc. Biol.* 1931. Vol. 108. No. 38. pp. 1116–1117.

The Brazzaville strain of *S. duttoni* was cultured in the presence of pieces of fowl embryo or of mouse brain and spleen, mixed with the plasma of either fowl, rabbit or monkey. The spirochaetes were found to diminish rapidly in number after being added to cultures, and also there was a corresponding diminution in the virulence of the cultures to mice. After 7 to 8 hours at 38°C. one out of six inoculated mice remained negative ; after 15 hours, four out of eight ; and on the third day all were negative.

It seems, therefore, that when this spirochaete is put in contact with cellular tissue and plasma, it rapidly loses its virulence, and according to the author does not complete the developmental cycle necessary for the production of the virulent stage of the organism.

E. H.

Lagrange (E.). Etudes sur la phase nerveuse de la fièvre récurrente expérimentale à *Spirochaeta Duttoni*. [**Studies on the Nervous Phase of Experimental Infection with** *S. duttoni*.]—*Bull. Soc. Path. Exot.* 1931. Nov. 12. Vol. 24. No. 9. pp. 804–809.

Using a strain of *S. duttoni* obtained from Brumpt, the author found a residual brain infection in only one of eleven mice, although it was present in the majority of rats that had been similarly inoculated. The intracerebral method of inoculation was found to be the most certain method of producing residual brain infections, in spite of the fact that the rats inoculated by this route all showed very few parasites in the blood. Occasionally brain infections were observed in rats that had been inoculated intraperitoneally and had shown no apparent blood infection. In one instance a residual brain infection was observed in a rat 242 days after the original inoculation. Infection was followed by immunity of long duration, but all attempts to immunize experimentally were negative. When immunized animals are reinoculated there is either no appearance of spirochaetes in the blood, or they appear for a short period not exceeding 24 hours.

Although infected brains kept in glycerine at 37°C. lose their virulence within a day, in one instance the author produced infection by the inoculation of such material kept for 24 hours in the ice-chest.

E. H.

Beunders (Bart Johan Willem). Onderzoekingen over de persistentie van *Spirochaeta duttoni* in de hersenen van muizen bij experimenteele febris recurrens. [**Persistence of *S. duttoni* in the Brains of Mice, Experimentally Infected.**] [Thesis for Doctorate in Medicine, Univ., Leiden.]—78 pp. With 6 figs. on 3 plates. 1932. Leiden: N.V. Leidsche Drukkerij, Morschsingel 14–15.

A large number of experiments have demonstrated the fact that the organisms of relapsing fever do persist in the brains of mice which have survived infection. The longest periods of such persistence were, in these experiments, 343, 373, 385 and 409 days, nor is there reason to believe that the limit has been reached. Success of this description is not attained with all strains but is given by the Hamburg (1906) spirochaete in nearly 100 per cent. of animals. The author is not in favour of the view, and in this he is in agreement with Wenyon, that the spirochaete is to be found in the brain as an infective granule. It is, however, difficult to demonstrate its presence directly and this is explainable as due to the very small numbers present. His arguments against the existence of a granule phase are :—(1) The brains of animals that have survived lose their infectivity at exactly the same temperature as kills spirochaetes of circulating blood. (2) Spirochaetes may not be evident, if they are sparse, to microscopic examination of the tissue. He has, however, been able to infect mice with a single spirochaete. (3) He has succeeded in staining actual spirochaetes in the brains of mice after their recovery from infection by the method of Steiner.

It seems reasonable, therefore, to conclude that the spirochaetes persist in the brain wholly in the form of spirochaetes.

W. F. Harvey.

Levaditi (C.), Auclair (J.) & Vaisman (A.). Influence de la pyrétothérapie (ondes courtes) sur l'évolution de l'infection récurrentielle du rat. [**The Effect of Pyretotherapy (Short Waves) on the Development of Relapsing Fever Infection in Rats.**]—*C. R. Soc. Biol.* 1932. Jan. 22. Vol. 109. No. 2. pp. 84–86.

The authors exposed rats and mice inoculated with *S. duttoni* to the action of hyperthermy for two periods of a few minutes each, without producing any obvious effect on the course of the infection. Moreover, 11 to 13 febrile attacks, in each of which the temperature rose about 4°C., produced by exposure to short waves, failed to destroy the invisible stage of the spirochaete in the central nervous system of infected rats. Approximately three months after the original infection, the brains of rats exposed to this treatment, and also those of controls, were found to contain the virus, and produced infection when inoculated into normal rats. All other organs were negative.

E. H.

Kritschewski (I. L.) & Demidowa (L. W.). Das Natriumthiosulfatphänomen. I. Die Verwandlung der salvarsanfesten Spirochäten zu salvarsanempfindlichen. [**The Sodium Thiosulphate Phenomenon. I. Conversion of Salvarsan-Resistant Races of Spirochaetes to Salvarsan Sensitive.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 73. No. 3/4. pp. 303–311.

The authors found that when salvarsan-resistant strains of spirochaetes (three strains of *S. duttoni*) were exposed to the action of

sodium thiosulphate they became susceptible to the action of the drug. Mice infected with the original resistant strains were inoculated intravenously with 0·05 cc. per gm. body weight of 2·5 per cent. sodium thiosulphate. These spirochaetes were then found to have lost their resistance to the action of salvarsan and after 17 to 18 passages in mice were still susceptible to the action of the drug, in contrast with the original strains which were still resistant.

The authors consider that the alteration in the resistance of the spirochaetes is possibly the result of new chemoreceptors being formed by the action of the thiosulphate. A table is given showing the very striking differences obtained in the treatment of mice infected with the original resistant strains, and others infected with the same strains after exposure to the action of sodium thiosulphate some time previously. All the latter, numbering 55 mice, were cured by injections of salvarsan, whilst with the same treatment only 3 out of 45 mice infected with the original strains were sterilized. *E. H.*

Lebedewa (M. N.) & Galanowa (N. W.). Ueber die Sterilisierung des Zentralnervensystems durch chemotherapeutische Agentien. I. Die Rolle des Temperaturfaktors bei der Therapie des Rückfallfiebers durch Salvarsan. [**Sterilization of the Central Nervous System by Chemotherapeutic Agents. I. The Influence of Temperature on Salvarsan Therapy in Relapsing Fever.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 74. No. 3/4. pp. 298–312. With 2 text figs. [12 refs.]

Mice infected with a Berlin strain of *S. duttoni* were treated with a Russian preparation of alkaline salvarsan, in doses of 0·0025 gm. per 20 gm. body weight. Some were treated in the early stages of the infection when there were not more than three spirochaetes to each field. Thirty of these mice were placed in a incubator at 40°C. for 2 hours before receiving the drug, and after treatment returned to the incubator for another 2 hours. Another 30 similarly infected mice were treated but kept at room temperature. Seventeen days later the brains of all the mice were inoculated into other animals in order to test for sterility, and 18 or 60 per cent. of the mice treated at room temperature were still infected, whereas all those that had been heated to 40°C. before and after treatment were found to have been completely sterilized. Another series of mice were treated at later stages of the disease after the brain had become infected and similar differences observed between the " heated " and non-heated mice. The heat itself, without salvarsan treatment, was found to have no appreciable effect on the brain infection. The effect of heating the mice seems to be to increase the amount of arsenic entering the brain, for the results of quantitative analyses showed that the brains of " heated " mice contained five to ten times as much arsenic as the brains of unheated mice that had received the same doses of salvarsan.

A histochemical analysis of the brains of the two kinds of mice, using Jancso's method, showed a distinct deposition of salvarsan in the brain vessels of the heated mice but none in the unheated controls. By means of other methods of analysis (nephelometric) the average amount of arsenic in the organs of five heated and five unheated was found to be as follows. The results are given in mgm. per 1 gm. organ :—

	Brain	Spleen	Liver
Unheated Mice	0·0126 mgm.	0·0263 mgm.	0·27 mgm.
Heated Mice	0·1 mgm.	0·014 mgm.	0·037 mgm.

Other experiments confirmed the view that the action of heating the mice was to lower the "haemato-encephalitic barrier." [This method seems to have been used in the treatment of human syphilis, as there are old records of patients being kept in hot baths whilst undergoing treatment.] *E. H.*

Dubois (A.). Traitement de l'infection de la souris par *Sp. duttoni* au moyen du solganal et solganal "B." [**The Treatment of Mice infected with** *S. duttoni* **by Means of Solganal or Solganal B.**]—*Ann. Soc. Belge de Méd. Trop.* 1931. Aug. 31. Vol. 11. No. 3. pp. 281–292.

Mice and rats infected with various Congo strains of *S. duttoni* were inoculated with varying doses of Solganal, or Solganal B, in some instances combined with 914. The results show that residual brain infections are particularly susceptible to these gold compounds, but although the medicament is active and well tolerated, the results vary according to the species of animal used for the tests and above all according to the strain of spirochaete. The author is of the opinion that these gold compounds are worth trying in human cases, since many strains of spirochaetes are resistant to 914, and especially because solganal seems to have neurotropic affinities and would possibly prevent the development of meningitis or ocular symptoms. The curative mechanism is considered to be capable of explanation by Ehrlich's old theory. Early and effective treatment of the infection prevents the development of natural immunity, and consequently such treatment leaves the patient susceptible to reinfection.

E. H.

Toda (Tadao). Ueber die Wirkung der chemotherapeutischen Mittel (besonders Goldpräparate) auf die im Gehirn persistierenden Recurrensspirochäten und ueber die grundlegenden Untersuchungen von der Persistenz der Recurrensspirochäten im Gehirn. Experimentelle Beiträge zur Therapie der Spirochätosis. I. Mitteilung. [**Experimental Studies on the Therapy of Spirochaetosis. Brain Infections. Part I.**]—*Jl. Oriental Med.* 1931. Dec. Vol. 15. No. 6. [In Japanese. German summary pp. 132–133.]

Mice infected with *S. duttoni*, *S. crocidurae* [another strain of *duttoni*], and *S. hispanica*, were treated with sanocrysin, triphal, krysolgan, solganal, gold salvarsan and neosalvarsan, respectively. Complete sterilization, including the brain tissue, was obtained only by the use of solganal, and of the remaining five compounds neosalvarsan was the best.

A strain of Manchurian relapsing fever, isolated ten years previously, has been subsequently maintained by passage in mice and occasionally in man. The original strain did not persist in the brains of infected mice, but after being passaged for ten years, its virulence

has increased and it has acquired the habit of producing residual brain infections. No difference could be detected in the resistance of the two strains to treatment with neosalvarsan. *E. H.*

Dickinson (Porter S.). Ueber die Wirkung des Salvarsans auf die Spirochäten im Gehirn von Recurrensratten bei Benutzung verschiedener Recurrensstämme und Variation des Behandlungstermins. [**The Action of Salvarsan on Spirochaetes in the Rat's Brain.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Mar. 19. Vol. 113. No. 4. pp. 682–689. [21 refs.]

The author uses two strains of relapsing fever, both Hamburg strains of *S. duttoni* and *S. angola* respectively. The first of these was resistant to salvarsan and the latter susceptible. No difference could be detected between the two strains as regards the persistence of residual brain infections in infected rats treated in various ways. A single subcutaneous injection of 0·0246 gm. sodium salvarsan per 100 gm. rat, which is almost the toxic dose, was administered at intervals varying from 2 days to 8 or 9 weeks after the inoculation of spirochaetes. All the 16 rats treated in this manner showed residual brain infections when examined eight days later although in every case the blood was negative. Other series of infected rats were injected four times at two-day intervals, with half the above dose of salvarsan, the treatment also starting at various intervals after the inoculation of the spirochaetes. The first series was inoculated with *S. duttoni* and a second series with the Angola strain. In both series all the rats except two treated two days after being inoculated with the spirochaetes showed residual brain infections and the blood was negative. In the first two, however, the blood was positive and brains negative. *E. H.*

van den Berghe (L.). Valeur comparative de divers procédés rapides de coloration pour la mise en évidence des tréponèmes et des leptospires dans les frottis. [**Staining of Spirochaetes in Films.**]—*Rev. Belge Sci. Méd.* 1931. Nov. Vol. 3. No. 9. pp. 994–999. [12 refs.]

After trying eight different staining methods recommended for spirochaetes, the author finds that all are inferior to dark ground examination, which is in every way the method of choice. The best method of staining was found to be Mühlpfordt's after fixation in Rüge or formol-alcohol as follows :—

Fix the film for 2 to 4 minutes in Rüge's formol acetic, or in absolute alcohol containing 10 per cent. formalin; allow to dry, and then stain for 2 to 3 minutes in a 3 per cent. aqueous solution of Victoria Blue 4 R (Grübler). Wash off the stain in water and allow to dry. The solution of the stain keeps indefinitely if kept in a brown bottle. *E. H.*

Delamare (G.) & Gatti (C.). Entérite algide spirochétienne. [**Spirochaetal Algid Enteritis.**]—*Bull. Acad. Méd.* 1932. May 17. 96th Year. 3rd Ser. Vol. 107. No. 19. pp. 657–659.

The clinical history of a fatal case in which enormous numbers of spirochaetes (*S. eurygyra* and *S. buccalis* types) were present in the intestine, associated with extreme enteric symptoms. *E. H.*

Delamare (G.) & Gatti (C.). Spirochètes et corps annulaires intra-leucocytaires. [**Spirochaetes and Intraleucocytic Annular Bodies.**]—*C. R. Acad. Sci.* 1932. May 23. Vol. 194. No. 21. pp. 1861–1862.

A description of the formation of rings or double rings from spirochaetes, in leucocytes from a case of Vincent's angina. [The appearances mentioned suggest the results of degeneration.] *E. H.*

Burket (J. A.). Bronchial Spirochetosis, with Report of a Case.—*Med. Bull. Veterans' Administration.* 1932. Jan. Vol. 8. No. 1. pp. 26–37. [26 refs.]

Kritschewski (L. L.) & Ssiniuchina (M. N.). Les appareils de défense de l'organisme dans la fièvre récurrente.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 284–288.

Laquièze. Spirilloses intestinales en Nouvelle-Calédonie.—*Ann. de Méd. et de Pharm. Colon.* 1931. Oct.-Nov.-Dec. Vol. 29. No. 4. pp. 860–861.

Nicolle (Charles) & Anderson (Charles). Sur le mécanisme de la transmission des spirochètes récurrents par les ornithodores.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 267–276.

Russell (H. M.). Preliminary Observations on Relapsing Fever.—*Gold Coast Rep. of Laboratory Services Year 1929–1930.* Appendix A. pp. 19–28. With 4 figs. on 2 plates & 6 charts. [See this *Bulletin*, Vol. 28, p. 730.]

Troisier (Jean). La spirochétose méningée ; son origine hydrique.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 254–255.

Troisier (Jean) & Boquien (Yves). Les porteurs de germes spirochétiques virulents chez le cobaye.—*1er Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 291–292.

LEPTOSPIROSIS.

LÉPINE (P.), CAMINOPETROS (J.) & PAGONIS (A.). Sur un foyer de spirochétose ictéro-hémorrhagique dans l'île de Syra. Infectiosité comparée des rats de Syra, du Pirée et d'Athènes. [**A Centre of Spirochaetal Jaundice in Syra. The Comparative Infectivity of the Rats of Syra, Piraeus and Athens.**]—*C. R. Soc. Biol.* 1932. Mar. 4. Vol. 109. No. 8. pp. 613–614.

PETZETAKIS (M.). L'épidémie de spirochétose ictéro-hémorrhagique de l'île de Syra. Sérodiagnostic et reproduction expérimentale. [**Spirochaetal Jaundice in Syra. Its Serodiagnosis and Experimental Transmission.**]—*Ibid.* pp. 646–647.

The sera of seven cases of infective jaundice occurring in Syra were sent to PETTIT and found to agglutinate *S. icterohaemorrhagiae*, although guineapigs inoculated with blood and urine from these patients remained unaffected. Subsequently six rats of the district were examined and all found to be infected, two of them producing fatal infections in guineapigs. 120 rats caught in Piraeus, and 13 in Athens, inoculated into 33 guineapigs, gave completely negative results. [This absence of infection is very surprising in view of the results of the examination of rats in other parts of the world.*]

E. Hindle.

LEGER (Marcel). Spirochétose ictéro-hémorragique à la Guadeloupe. [**Spirochaetal Jaundice in Guadeloupe.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 304–306.

The clinical history of suspected cases of this disease in Guadeloupe. The diagnosis was confirmed by the use of a strain of *S. icterohaemorrhagiae* from the Pasteur Institute, Paris, which was agglutinated by the serum of two of the cases in dilutions of 1 : 1,000. When these same sera were mixed with a neurotropic strain of yellow fever virus and inoculated intracerebrally into mice, no protection was observed, thus excluding the possibility of these being undiagnosed cases of yellow fever. *E. H.*

SMITS (E.). Ziekte van Weil op Tarakan (Borneo). [**Weil's Disease in Tarakan (Borneo).**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Mar. 1. Vol. 72. No. 5. pp. 284–286.

Smits, whose previous experience in Sumatra made him familiar with the clinical picture of leptospirosis, recognised 26 cases in two years in Tarakan, an island on the N.E. Coast of Borneo ; 3 cases ended fatally. For diagnosis value is attached to the conjunctival injection.

As regards the epidemiology the author could not trace contact with polluted water as the source of the infection. River water is polluted with oil from the factory and not used for bathing purposes. Dogs and rats are present in abundance. The author lays stress upon the fact that Weil's disease is far more prevalent in men than in women and children ; he asks how this can be explained if the infection is caused by polluted water only. *W. J. Bais.*

* But see below PETZETAKIS, p. 568, four out of ninety-six rats were positive.

Brown (E. Kempson) & Cleveland (Arthur J.). **A Case of Spirochaetosis Icterohaemorrhagica.**—*Brit. Med. Jl.* 1932. Feb. 13. pp. 283–284.

The record of a fatal case of this disease in a Norfolk farmer, the clinical diagnosis being confirmed by the discovery of spirochaetes in the kidney on postmortem examination. The patient was bitten by a ferret five days previous to being taken ill, and the ferret had been bitten in the mouth by a rat just before biting the farmer. Subsequently the ferret died. It is noted that most rat catchers state that any wounds from rats may be fatal to ferrets unless they are at once disinfected; a common practice is to urinate on the wound. *E. H.*

Hirano (H.). **Study on a Philippine Strain of** *Leptospira icterohaemorrhagiae.*—*Philippine Jl. Sci.* 1932. May. Vol. 48. No. 1. pp. 103–113. With 1 text fig.

A detailed experimental study of a strain of *S. icterohaemorrhagiae* isolated from the urine of a fatal case of infectious jaundice occurring in a long-time resident of Manila. Although typical symptoms were produced in guineapigs by passage inoculation, the virulence of this Manila strain in experimental animals (guineapigs and mice) was strikingly low compared with that of the Japanese strains studied. About half the animals recovered, and some of these became carriers, passing large numbers of leptospira in the urine. Animals subinoculated with these organisms showed febrile symptoms and in turn usually became carriers. The low virulence of the Manila strain is offered as a possible explanation of the rarity of Weil's disease in Manila among rats as well as men. *E. H.*

Erber (Berthe). Agglutination de spirochétidés par le sérum d'animaux. [**The Agglutination of Spirochaetes by Animal Sera.**] —*C. R. Soc. Biol.* 1932. Jan. 29. Vol. 109. No. 3. pp. 165–168.

The author, after numerous examinations, found that human serum never agglutinates *S. icterohaemorrhagiae*, except when there is a record of the patient having been infected with this spirochaete. On the other hand animal sera gave conflicting results. The reaction was always negative with the serum of sheep, rabbits [but see Brown and Davis, this *Bulletin*, Vol. 25, p. 106], mice, guineapigs, white rats, hamsters and a grass snake. Wild rats invariably gave a positive agglutination in dilutions of from 1 : 50 to 1 : 2,000. Dogs gave positive results in about half the sera examined. All normal horse sera also gave positive reactions in dilutions varying from 1 : 50 to 1 : 500; in immunized horses the reaction was weaker. The sera of 9 *Macaca cynomolgus* comprised one positive and eight negative; 279 *Cynocephalus papio*, or *C. hamadryas*, gave 11·8 per cent. positive. A gorilla gave a reaction in a 1 : 2,000 dilution; 2 chimpanzees were negative, but a third positive. A strain of leptospira isolated from Tokio water was agglutinated by dilutions of 1 : 30 with guineapig serum; 1 : 50, with two horse sera; 1 : 100 with a rabbit serum; 1 : 200 with a wild rat serum. Six fresh horses gave positive agglutinations in dilutions respectively of 1 : 100 to 1 : 500. A gorilla and chimpanzee both gave negative results. With another water strain from Erlangen, and also

the Vincent strain from Paris water, similar but feebler agglutinations were obtained. The results will be discussed more fully in a later communication. *E. H.*

Schüffner (W.). Versuch der Vereinfachung der Serodiagnostik bei Weilscher Krankheit. [**Attempts to simplify the Serodiagnosis of Weil's Disease.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Apr. Vol. 36. No. 4. pp. 239–243. With 2 text figs.

The author describes a method of agglutination developed by one of his assistants, Dr. S. Proehoeman. Richly grown cultures of the leptospira are mixed either with 0·5 per cent. phenol, or preferably with 1 to 2 per cent. formalin. After the cultures have been allowed to settle they are suspended in 10 per cent. glucose, a homogeneous suspension of the organisms being obtained which will persist for one to two months. This suspension gives very satisfactory results when used to test the agglutination properties of the serum of suspected cases of Weil's disease. *E. H.*

Postmus (S.) & Schultsz (Th. W.). Technische opmerkingen betreffende de bacteriologische en serologische diagnostiek der ziekte van Weil (Spirochaetosis icterohaemorrhagiae). [**Technique of the Bacteriological and Serological Diagnosis of Weil's Disease.**] —*Nederl. Tijdschr. v. Geneesk.* 1932. Jan. 16. Vol. 76. No. 3. pp. 252–261. With 2 text figs. English summary.

The methods are (1) direct demonstration of leptospira in the blood of the patient, (2) blood culture, (3) culture from the urine and (4) agglutination-lysis tests.

In method (1) 10cc. blood (taken as soon as fever manifests itself) and 2 cc. 2 per cent. sodium citrate are centrifuged 5 min. at 1,500 revolutions to bring down the leucocytes and erythrocytes. The supernatant fluid is then centrifuged again for 5 min. at the same rate to bring down blood platelets. A final centrifugation for 30 min. at 3,000 revolutions gives a deposit which is examined for leptospira. Blood culture by the second method may be direct or after passage in the guineapig. Of all these methods the first gives, when positive, the earliest possible diagnosis and this enables serum therapy to be begun in good time.

W. F. Harvey.

Bessemans (A.) & Thiry (U.). Sur les leptospires isolés en Flandre orientale.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 244–247.

Brulé (M.), Lièvre (J. A.) & Tsatsaronis. Deux cas de spirochétose ictérigène à type d'ictère catarrhal ; anémie spirochétosique.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Apr. 25. 48th Year. 3rd Ser. No. 13. pp. 520–524.

Caminopetros (T.). Sur l'existence de foyers de spirochétose ictéro-hémorragique murine à Athènes, à Syra et au Pirée. Identité des souches murines avec une souche humaine isolée à Athènes —*C. R. Soc. Biol.* 1932. May 6. Vol. 109. No. 15. pp. 1316–1317.

Petzetakis (M.) & Kyriazides (K.). Sur la présence de *Spirochaeta icterohemorragiae* chez les rats d'égout, à Athènes.—*C. R. Soc. Biol.* 1932. Apr. 15. Vol. 109. No. 12. pp. 1083–1084.

Schüffner (W.). Die weilsche Krankheit unter besonderer Berücksichtigung abweichender Fälle.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 248–252.

Tarassoff (Serge). La question des leptospiroses en U.R.S.S.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 252–253.

Uhlenhuth (P.). Epidemiologie der Weilschen Krankheit mit besonderer Berücksichtigung der Wasserinfektion.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 225–243. French summary.

Zuelzer (Margarete). Virulenzsteigerung von Wasserspirochaeten im Tierversuch.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 256–262. With 2 text figs.

RAT-BITE FEVER.

Saisawa (Kozo); Taise (Kuniichi). **On *Spirochaeta morsus muris* appearing in the Peritoneal Fluid of the Mouse. (First Report)** [Saisawa & Taise].—*Japanese Jl. Experim. Med.* 1932. Feb. 20. Vol. 10. No. 1. pp. 1–19. With 3 figs. on 1 plate. **(Second Report)** [Taise].—*Ibid.* pp. 21–25. **(Third Report). On the Agglomeration Phenomenon of the *Spirochaeta morsus muris*** [Taise].—*Ibid.* pp. 27–28. With 4 figs. on 1 plate.

Mice inoculated in various ways with a strain of *S. morsus muris* [=*Spirillum minus*] were found to show large numbers of these organisms in the peritoneal fluid. They begin to appear in this fluid 4 to 5 days after inoculation and reach their maximum 5 to 6 days later, 10 to 50 or more being found in one field. They appear in the blood somewhat later and their numbers never exceeds 5 to 6 per field. Also the numbers of spirilla in the peritoneal fluid show no apparent decrease and continue indefinitely until the death of the animal, whereas the numbers in the blood gradually diminish. The concentration of the peritoneal fluid was found to affect the number of spirilla, the older mice with the higher concentrations showing larger numbers than younger mice with lower concentrations of the fluid. Consequently it is advisable to use mice weighing at least 20 gm. in order to obtain large numbers of the organisms. Splenectomy is stated to have caused an increase in the numbers if the infection was previously mild, but to have had no effect on heavy infections.

The second report contains details of further experiments on this problem. The number of spirilla appearing in the peritoneal fluid was found to be slightly larger in French mice than in German ones. [Paragraph 4 contains statements concerning mice weighing 80 to 90 gm. and is unintelligible.] Guineapigs and rabbits inoculated with these organisms show mild infections in young animals, but very scanty infection in adults. Mice infected with *S. icterohaemorrhagiae* showed more of these organisms in the peritoneal fluid than in the blood, but mice infected with *S. duttoni* showed very many more parasites in the blood than in the peritoneal fluid. *S. pallida* did not appear in either blood or peritoneal fluid. The author considers the organism of rat-bite fever to be a true spirochaete of lymphatic nature which invades all parts of the body. When treated with neosalvarsan in quantities below the curative dose, the organisms persist in the brain and spleen whence they reinvade other parts of the body. The organism could not be found in the alimentary canal or in the urine, and attempts to

infect mice *per os* gave negative results. Mice (20 gm.) could be completely cured by the injection of 1/300 gm. neosalvarsan, or of silver-salvarsan, and 1/176 to 1/200 gm. of neo-silver-salvarsan.

In the third part, attention is called to the remarkable agglomerations of this organism, sometimes balls being formed containing 400–500 spirilla and measuring 40 to 50μ in diameter. This phenomenon is usually found in young and adult mice showing vigorous life and it is commonest in peritoneal fluids of low concentration, being found in 5 to 10 per cent. of the infected animals. Under the dark field these clumps move like a rolling ball. The agglomeration may be produced artificially by splenectomy of an infected mouse, or by the intraperitoneal injection of the serum and organ extracts of various animals. The necessary conditions for this artificial production of the phenomenon are a large number of spirilla, a high concentration of the peritoneal fluid and injection into the peritoneum. When formed naturally, agglomerations generally appear about the tenth day of infection, and may persist for 2 or 3 days up to a month or more. When produced artificially, agglomeration starts about 15 minutes after the injection, reaches its maximum in about an hour, and disappears as the injected fluid is absorbed. The cause of this phenomenon is not known. *E. Hindle.*

Vazquez-Colet (Ana). **Rat-Bite Fever in the Philippines.**—*Philippine Jl. Sci.* 1931. Oct. Vol. 46. No. 2. pp. 159–167. With 8 figs. on 3 plates.

An account of a case of typical rat-bite fever in a native child in Manila, in which the causative agent of the disease was demonstrated in tissue smears from the patient, and also recovered from mice and guineapigs inoculated with the infective material. This seems to be the first definite record of the existence of this disease in the Philippine Islands. *E. H.*

Anderson (Nelson Paul) & Spector (Bertha Kaplan). **Rat-Bite Fever associated with Sporothrix.**—*Jl. Inject. Dis.* 1932. Apr. Vol. 50. No. 4. pp. 344–349. With 1 text fig. [20 refs.]

From a clinically typical case of rat-bite fever in the United States, the authors isolated a sporothrix-like organism which gave a strong complement fixation and agglutination with the patient's own serum and also with serum obtained from a case of the lymphangitic type of sporotrichosis. Blood and serum obtained from an incised gland were examined on two separate occasions but spiral organisms could not be detected and subinoculations into white rats gave negative results. On both occasions, however, a plentiful growth of sporothrix was obtained in cultures of both blood and serum. *E. H.*

Araujo (Eduardo). Diagnostic expérimental d'un cas de sodóku.—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1931. Nov. Vol. 2. No. 11. pp. 1125–1128.

Schockaert (Jos.). L'unicité des souches du "*Spirillum minus*," agent étiologique du sodoku.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 288–290.

Stefani (F.). Un caso di sodoku : il primo segnalato in Polesine.—*Giorn. di Clin. Med.* 1930. Sept. 20. Vol. 11. No. 13. pp. 931–932.

YELLOW FEVER.

BERRY (G. P.) & KITCHEN (S. F.). **Yellow Fever accidentally Contracted in the Laboratory. A Study of Seven Cases.**—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 365–434. With 11 text figs. [58 refs.]

An exact record of clinical and laboratory observations on seven patients who contracted yellow fever in the Yellow Fever Laboratory of the Rockefeller Foundation in New York subsequent to March, 1929. In addition the authors give a table containing a useful summary of the total of 32 laboratory infections recorded up to date which, however, do not include the three additional cases described in detail by LOW and FAIRLEY [see this *Bulletin*, Vol. 28, p. 290]. The clinical symptoms of these laboratory infections have varied between extremely mild, sometimes mistaken for a mild attack of influenza, and extremely severe resulting, in many cases, in death. In three instances infection was acquired from virus that had been passed through mice, and in two others the infection was the result of the bites of infected mosquitoes. In the remaining cases, however, there is no definite evidence of the method of infection, but it is assumed that contact with the blood or other tissues of infected monkeys resulted in the accidental infections, especially since the virus is known to be capable of penetrating the unbroken skin.

The seven patients whose cases are described in detail included infections ranging from very mild to moderately severe, and they all recovered ; it is of interest that the only constant sign of the disease was the paradoxical pulse-temperature relationship, a falling pulse with a rising temperature. Bradycardia occurred independently of jaundice and additional evidence of myocardial injury was obtained by X-ray measurements of acute dilatation of the heart and by electrocardiograms. Convalescent human serum in amounts of 5 cc. given at bi-monthly intervals failed to prevent laboratory infections. The authors observed a guanidine increase in the blood of one of the mildly infected patients, thus confirming FINDLAY and HINDLE'S observations in monkeys [see this *Bulletin*, Vol. 28, p. 293]. A systematic study of the blood count showed an initial leucopenia due mainly to decrease in neutrophiles, reaching its lowest point about the 5th or 6th day. The monocyte count rose during convalescence. The diagnosis was confirmed by the successful transfer of the virus to monkeys and mice, and by the demonstration of protective antibodies. In one patient, virus was shown to exist in the blood 107 hours after the onset of fever, whilst antibodies were detected after 83 hours, thus confirming the simultaneous presence of virus and antibody in human blood in yellow fever.

E. Hindle.

CAZANOVE. A propos des récentes infections de laboratoire de fièvre jaune. [**Recent Laboratory Infections with Yellow Fever.**]—*Rev. Méd. et Hyg. Trop.* 1931. Nov.-Dec. Vol. 23. No. 6. pp. 293–294.

The author gives interesting extracts from BERENGER-FÉRAUD'S monograph which suggest cases of direct infection of yellow fever. A young pathologist in Paris received some " black vomit " from Rio de Janeiro in December, 1873, and as the temperature was cold thought there was no possibility of the material being infective. A few days

after starting the analysis of this material, however, he became infected and died with all the characteristic symptoms of yellow fever. Details are also given of four persons who about 1882 were present during the examination in Paris of infected blood and black vomit collected from a yellow fever patient in Senegal. All were subsequently affected in various ways and showed symptoms which might be explained on the assumption that they were mild cases of yellow fever. *E. H.*

Sawyer (W. A.), Kitchen (S. F.) & Lloyd (Wray). **Vaccination of Humans against Yellow Fever with Immune Serum and Virus fixed for Mice.**—*Proc. Soc. Experim. Biol. & Med.* 1931 Oct. Vol. 29. No. 1. pp. 62–64.

The authors have found the most effective method of vaccination for immunizing human beings against yellow fever to be a simultaneous injection of yellow fever virus, attenuated by at least 100 passages through the brains of mice, and human immune serum. The virus suspension was prepared by making a 10 per cent. suspension of mouse brain tissue containing yellow fever virus in fresh, sterile, human, immune serum. The suspension was centrifuged, and the supernatant fluid passed through a Seitz or Berkefeld N filter. The filtrate was then tubed in 1 cc. portions and dried whilst frozen. The immune serum was obtained from patients recently recovered from yellow fever and was only considered suitable if 0·3 cc. per kilo bodyweight administered subcutaneously protected monkeys against a simultaneous injection of virus. 0·2 per cent. tricresol was added to the pooled serum. Ten persons were vaccinated, first receiving subcutaneous doses of the dried mouse virus which was dissolved in distilled water so as to restore the original volume. The amount of this fluid used was 0·03 cc. per kilo body weight and its inoculation was followed immediately by subcutaneous inoculations of the immune serum in two different places of the abdominal wall. The dose of this additional immune serum was 0·3 cc. per kilo body weight. None of the ten persons showed any symptoms of importance, yet they all developed protective power against yellow fever virus as tested by protection tests in mice and also (in 7 cases) in monkeys. Attempts to recover virus from the circulating blood 24 hours after vaccination were made in three cases but were unsuccessful. *E. H.*

Sellards (A. W.) & Laigret (J.). Vaccination de l'homme contre la fièvre jaune. [**Vaccination of Man against Yellow Fever.**]—*C. R. Acad. Sci.* 1932. May 2. Vol. 194. No. 18. pp. 1609–1611.

The authors inoculated five patients with emulsions of the brains of mice infected with yellow fever after 134 passages in mice. The infected brains were emulsified in sterile physiological saline solution containing 10 per cent. rabbit serum, 4·5 cc. being used for each mouse brain. This emulsion, corresponding to a dilution of 1 in 10, was centrifuged for three or four minutes and the supernatant fluid used for further dilutions. One drop of a dilution of 1 : 100,000 was found to be invariably fatal to mice inoculated intracerebrally. 1 cc. of a dilution of 1 : 10,000 or even of 1 : 1,000 inoculated subcutaneously into human subjects was found to produce no reaction but was followed by the development of protective antibodies in the blood. The inoculation of 1 cc. of a dilution 1 : 100 was followed by a slight rise in

temperature on the sixth and seventh days, accompanied with bradycardia and traces of albumen in the urine. These symptoms were only found by careful examination, the patient himself not being conscious of any malaise. After an inoculation of 1 : 10,000 or 1 : 1,000 dilution, increasing doses may be given without producing any ill effects, in one case the equivalent of half a mouse brain being inoculated. Immune bodies appear in the blood from the 7th to the 34th day after vaccination and probably persist for long periods. The authors recommend the use of this method for the protection of the population in regions where yellow fever is prevalent. Attempts to vaccinate patients with a mouse virus killed by chloroform, gave uniformly negative results.

E. H.

Aragão (H. de Beaurepaire). Vaccination par le sérum et le virus dans la fièvre jaune. [**Vaccination with Serum and Virus in Yellow Fever.**]—*C. R. Soc. Biol.* 1931. Dec. 18. Vol. 108. No. 37. pp. 1078–1080.

The author gives examples of five monkeys inoculated with immune or hyperimmune serum, and 24 hours later with a dose of yellow fever virus. None of these animals showed any signs of infection and the reinoculation of virus after intervals ranging up to six months from the first dose also failed to show any signs of loss of immunity against the virus. This method is considered to be a simple and effective means of protection against yellow fever [see Findlay and Hindle, *ante*, p. 201]. *E. H.*

Millous, Raboisson & Pluchon. Observations cliniques sur un cas isolé de fièvre jaune traité par le sérum de Pettit. [**Clinical Observations on a Case of Yellow Fever treated by Pettit's Serum.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 362–366.

A yellow fever patient in West Africa received injections of Macaca anti-yellow fever serum prepared by Pettit ; 10 cc. were given on the 7th day of the disease and 20 cc. on each of the two following days. Before the nature of the disease was established the patient had received injections of anti-pneumonic horse serum, and large doses of calcium chloride. This patient recovered, but another patient in Togoland treated with large doses of anti-yellow fever serum succumbed to the disease. *E. H.*

Hindle (E.). **An Attempt to demonstrate Residual Virus in Monkeys which had recovered from Yellow Fever.**—*Brit. Jl. Experim. Path.* 1932. Apr. Vol. 13. No. 2. pp. 135–140.

The persistence of a high degree of immunity following an attack of yellow fever led the author to make experiments with rhesus monkeys that had recovered from the disease, in order to determine whether this persistent immunity was linked up with a residual infection, or carrier condition. Yellow fever virus and immune bodies are known to coexist in the blood during the febrile attack [see this *Bulletin*, Vol. 28, p. 285 and *ante*, p. 201] ; therefore it is not impossible that virus might persist in the body of an animal showing a high degree of immunity. Accordingly monkeys were inoculated with suspensions of the tissues (brain, liver, kidney, and spleen) of animals recovered from yellow

fever. These tissues had been carefully washed to remove all traces of blood containing immune bodies, in order to permit the development of any virus that might have been masked by their presence. None of the inoculated monkeys showed any signs of infection, but those inoculated with liver and spleen developed a transient immunity, the duration being that produced by the inoculation of immune serum alone and probably passive in nature. The inoculation of kidney and brain tissue failed to produce even a transient immunity, but the inoculation of washed leucocytes (one experiment) from an immune animal conferred protection.

The inoculation of an over-neutralized mixture of yellow fever virus and antiserum was found to evoke an active immunity of long duration; therefore, had any residual virus been present in the tissues of the recovered animals, its inoculation, even combined with immune bodies in the tissue, should have produced some effect. Since the immunity following the inoculation of liver and spleen had only the duration of the passive immunity conferred by the inoculation of immune serum, these findings suggest that yellow fever virus does not persist in the tissues of recovered monkeys.

In another series of experiments mosquitoes (*Aedes aegypti*) fed on mixtures of virus and immune serum failed to become infective; consequently, this method is of no use for demonstrating the possible presence of virus in the tissues of recovered animals. Mosquitoes fed artificially on suspensions of virus readily became infected but the addition of immune serum to such suspensions prevented the development of infection within the insect. *E. H.*

BAUER (Johannes H.). **The Duration of Passive Immunity in Yellow Fever.**—*Amer. Jl. Trop. Med.* 1931. Nov. Vol. 11. No. 6. pp. 451–457.

The author's results indicate that the passive immunity to yellow fever conveyed to monkeys by the immune serum of an homologous species is of considerably longer duration than that conferred by the immune serum of a foreign species. 2·0 cc. of the pooled monkey immune serum used in these experiments gave complete protection in monkeys. This protection lasted for at least three weeks, but at the end of seven weeks had completely disappeared. In another series of experiments the monkeys were given 5·0 cc. of human immune serum. These were found to be immune when virus was given 7 days later, but before the end of 14 days the immunity had completely disappeared.

E. H.

SAWYER (W. A.). **The Persistence of Yellow Fever Immunity.**—*Jl. Preventive Med.* 1931. Nov. Vol. 5. No. 6. pp. 413–428. [10 refs.]

A record of the results of protection tests in monkeys with the sera of 60 persons who had had what was believed to be yellow fever between 30 and 78 years before the specimens of serum were obtained. The sera of 45, generally in doses of 3 cc., were proved to be protective, including five out of six sera from persons infected 75 years previously, and one 78 years. Immunity from yellow fever ordinarily seems to last for life and can be demonstrated by protection tests in either rhesus monkeys or white mice; moreover, this immunity is not dependent

on any subsequent exposure to infection. Although there is evidence suggesting that in some cases the concentration of antibodies in the serum may gradually diminish until they are no longer demonstrable by protection tests with ordinary amounts of serum, it does not follow that such persons become capable of being re-infected. The evidence suggests that in many of the cases in which the serum does not protect monkeys there has been an error in the original diagnosis of yellow fever. *E. H.*

SELLARDS (Andrew Watson). **Technical Precautions employed in maintaining the Virus of Yellow Fever in Monkeys and Mosquitoes.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 79–92. With 5 text figs.

Details are given of the author's methods which have been used for the maintenance of a virulent strain of yellow fever in monkeys and mosquitoes over a period of three and one-half years, during which no laboratory infections have been acquired from either monkeys or mosquitoes. The drying of frozen virus is discouraged as it is considered to be dangerous to handle, and the author prefers the use of infected blood kept frozen at about –8°C. It is stated to maintain its virulence for many months under these conditions. *E. H.*

MATHIS (Maurice), MARTIN-CHARPENEL (G.) & KOLOCHINE (G.). Adaptation du virus amaril à la souris blanche. [**The Adaptation of Yellow Fever Virus to White Mice.**]—*Bull. Soc. Path. Exot.* 1932. Feb. 10. Vol. 25. No. 2. pp. 113–117.

Experiments were made with a mouse virus strain obtained from THEILER, at the 124th passage in mice when received, and a strain from monkeys recently inoculated into mice by the authors. After the third passage in mice this latter strain resembled Theiler's strain in its general effects. A series of protection tests were made with these two strains, using mixtures of a suspension of virulent mouse brain with normal rabbit serum, anti-yellow fever horse serum, or monkey immune serum, respectively. The mixtures were allowed to stand for 30 minutes and then inoculated intracerebrally into mice. Both strains of virus were found to be neutralized by the horse anti-yellow fever serum and the monkey immune serum. *E. H.*

RUSSELL (F. F.). **The Study of Yellow Fever by a Protection Test in Mice.**—*Amer. Jl. Med. Sci.* 1932. Jan. Vol. 183. No. 1. pp. 87–90.

The impression that yellow fever has almost disappeared from the world has been shown to be too optimistic for, as the author points out, the disease still persists in South America and is widely prevalent in West Africa. In the endemic areas the cases are few and apparently sporadic, but when the virus is carried outside these areas it may give rise to true epidemics. It is now generally accepted that an attack is followed by a permanent immunity, and by the use of protection tests in mice or monkeys it is possible to detect this immunity. Consequently the boundaries of endemic areas can be delimited by examining the blood serum of children, preferably using mice for the protection test. The presence or absence of yellow fever within the lifetime of each child can thus be determined. *E. H.*

GOODPASTURE (Ernest W.). **Yellow-Fever Encephalitis of the Monkey** (*Macacus rhesus*).—*Amer. Jl. Path.* 1932. Mar. Vol. 8. No. 2. pp. 137–150. With 11 figs. on 3 plates.

A study of the pathological changes in monkeys and mice infected with yellow fever, based on material supplied by SELLARDS. Monkeys inoculated intra-cerebrally with a mouse strain of the virus showed an acute disseminated encephalomyelitis, apparently extending throughout the central nervous system, affecting the cellular tissues and causing necrosis of both sensory and motor ganglion cells. Intranuclear inclusions sometimes resembling, but more often different from, those characteristic of the disease, were found with difficulty in the ganglion cells of five out of the nine monkeys examined. Cytologically, these inclusions are inconclusive evidence of the nature of the disease; on immunological and histological grounds, however, it is considered that the virus of mouse and monkey encephalitis represents a biologically modified strain of yellow fever virus. *E. H.*

PETTIT (A.) & AGUESSY (C. D.). Le chimpanzé est-il réceptif au virus amaril. [**Is the Chimpanzee Susceptible to Yellow Fever ?**]—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 190–191

A chimpanzee was inoculated intraperitoneally with 5 cc. of a mixture of blood and liver from a typical case of yellow fever in a *Macaca rhesus*, and at the same time two rhesus monkeys were inoculated as controls. Both the latter died of yellow fever but the chimpanzee showed no signs of infection. Nevertheless its serum acquired protective properties against the disease, in this respect resembling other refractory monkeys which have been used for the preparation of anti-yellow fever serum. *E. H.*

HUDSON (N. Paul). **Dried Infectious Monkey Serum as Antigen in Yellow Fever Complement Fixation.**—*Amer. Jl. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 557–565.

The desirability of a simple test for the presence of immunity in monkeys that had been vaccinated in various ways, led the author to make further experiments with the complement-fixation reaction. The most effective antigen was found to be pooled monkey serum collected during the febrile period of acute attacks of yellow fever. If dried, in a frozen state, such serum maintained its properties for more than a year. Although not highly sensitive, this was found to be a more satisfactory antigen than infectious monkey liver, which occasionally gave false positive tests. Using antigen dilutions of 1 : 20 to 1 : 1,000 against a constant serum dilution of 1 : 5 and over-night fixation at about 5°C., the serum of four out of seven human convalescents gave a positive reaction. The sera of recovered monkeys usually gave positive fixation tests (12 positive, one negative and 3 anticomplementary); but monkeys surviving vaccination by various methods, including vaccine followed by virus, or immune serum and virus, nearly always gave negative reactions, Out of 55 monkeys that were tested one was positive, two weakly positive, 45 negative and 7 anticomplementary. It is concluded, therefore, that this method is not an effective means of determining the establishment of immunity in vaccinated monkeys. *E. H.*

FROBISHER (Martin), Jr. **Precipitin Experiments with Yellow Fever Virus.**—*Amer. Jl. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 485–497. [15 refs.]

Rabbits repeatedly inoculated with large numbers of mosquitoes containing yellow fever virus, failed to develop any precipitins or protective bodies against the same virus in monkey blood. Also the injection into rabbits of large amounts of the virus from the blood of infected monkeys failed to produce any demonstrable precipitins against the virus in mosquitoes, although the injection of relatively very tiny amounts (0·02 cc.) of monkey-blood virus produced protective bodies against the same blood virus. It seems possible, therefore, that the virus in the mosquito may differ from the blood virus. The blood meal of the *Aedes aegypti* used in these experiments was found to average about 2·43 mgm. Using an anti-monkey serum capable of showing a precipitin reaction with a 1 : 20,000 dilution of monkey serum, it was not possible to detect monkey protein in these mosquitoes later than the fourth day after their blood meal. *E. H.*

HAAGEN (E.) & THEILER (M.). **Studies of Yellow Fever Virus in Tissue Culture.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Jan. Vol. 29. No. 4. pp. 435–436.

The authors have cultivated a strain of yellow fever pathogenic for mice, by using a medium consisting of minced chicken embryos 8 to 10 days old, suspended in a mixture of normal monkey serum and Tyrode solution, contained in Carrel dishes, and incubating at 37·5°C. The virus for the primary culture was prepared by grinding up infectious mouse brain with 9 times its weight of Tyrode solution and centrifuging the suspension for 10 minutes at 3,000 r.p.m. One part of the supernatant fluid was added to 4 parts of the culture medium and the mixture distributed in several Carrel dishes, about 2·0 cc. in each. Thus the final dilution of the virus was 1 : 50 that of the brain tissue. The cultures and subcultures were always tested for bacteriological sterility but no visible organisms were ever detected. Subcultures were made every three or four days using 0·5 cc. of the supernatant fluid of the culture to 2·0 cc. of fresh medium, each subculture thus resulting in a 1 : 5 dilution of the original virus content. It is estimated that at the 20th subculture the virus had been diluted about 5 million billion (5×10^{15}) times and yet the latest subcultures (22nd) were just as infectious as the original material. It is evident, therefore, that the virus multiplies in this medium. It appears that the virus of yellow fever like other filterable viruses needs living cells for growth *in vitro*. It is extremely labile and is changed or destroyed by minute changes in the culture medium. With the above described method, however, it is possible to grow yellow fever virus indefinitely by a method which has been used successfully for the cultivation of other filterable viruses.

E. H.

GÉRARD (P.), MOISSONNIER & WELTI. Métabolisme des lipoïdes dans la fièvre jaune expérimentale. [**Lipoid Metabolism in Experimental Yellow Fever.**]—*Bull. Acad. Méd.* 1932. Mar. 15. 96th Year. 3rd Ser. Vol. 107. No. 11. pp. 395–399.

As a result of the examination of more than 500 samples of tissues of monkeys dying of yellow fever, the authors come to the following

conclusions. There is a lowering in the amount of lipoid phosphorus and in the lipocytic coefficient ; an increase in the ratio of fatty acids to total lipoids ; and a marked diminution of unsaponifiable fats in certain organs, especially the supra-renals, kidneys and heart, which is not explained by the lowering of the cholesterol content. In spite of these changes the so-called " constant element," consisting of phosphatic fatty acids, does not alter. *E. H.*

Kuczynski (Max H.). Magenveränderungen durch eine Sekundärinfektion mit *B. enteritidis* Gärtner bei gelbfieberinfizierten Meerschweinchen. [**Stomach Changes produced in Guineapigs infected with Yellow Fever, by Secondary Infection with** *Bact. enteritidis*.] —*Virchows Arch. f. Path. Anat.* 1931. Aug. 17. Vol. 281. No. 2. pp. 422–429. With 8 text figs.

The author has previously described the presence of acute haemorrhagic ulcerations in the stomachs of animals infected with yellow fever [see this *Bulletin*, Vol. 27, p. 478]. Some of these animals also showed peritonitis and the exudate has been found frequently to contain *Bact. enteritidis* Gärtner, sometimes mixed with other organisms. It was found that yellow fever in guineapigs favoured the development of these secondary infections and in such cases extensive necrotic changes occurred in the stomach wall, which were quite distinct from those produced by yellow fever, but resembled in some respects the lesions that have occasionally been described in human cases of paratyphoid. The histological changes occurring in the stomach are well illustrated by photographs. *E. H.*

Schüffner (W.). Entwicklung und heutiger Stand der Gelbfieberforschung. [**The History and Present Position of Yellow Fever Investigation.**]—*Klin. Woch.* 1932. Apr. 30. Vol. 11. No. 18. pp. 753–757. With 7 text figs.

A general review of certain aspects of yellow fever investigations. The main interest of the article is contained in the observation, made by Postmus, that the yellow fever strain at Amsterdam, after 50 passages in the brains of mice, had lost its virulence to monkeys (as observed by others) ; nevertheless, *Aedes aegypti* fed on an emulsion of infected mouse brain at the 50th passage, and after the necessary interval subsequently fed on a monkey, produced a fatal attack of yellow fever, the full virulence of the virus being restored by passage through the insect host. *E. H.*

Byrne (J.). **A Case of Unclassified Fever at Nsawan, Gold Coast, during the Epidemic of Yellow Fever in 1926.**—*West African Med. Jl.* 1931. July. Vol. 5. No. 1. p. 13.

This case was observed in 1926 ; a mild case of fever without jaundice but the patient felt ill and depressed. The suggestion was made that the case might be one of mild yellow fever but in the absence of all classical signs this diagnosis was not accepted.

In April 1929 the serum of the patient was sent to the Rockefeller laboratories at Lagos for a protection test ; this was found to be strongly positive, showing that the patient had actually suffered from yellow fever. *D. Harvey.*

Sawyer (Wilbur A.). **Recent Progress in Yellow Fever Research.**—*Medicine.* 1931. Dec. Vol. 10. No. 4. pp. 509–536. [32 refs.]

A summary of recent publications with special reference to the work of the members of the International Health Division of the Rockefeller Foundation. *E. H.*

Sawyer (W. A.). **The History of Yellow Fever since the New Orleans Epidemic of 1905.**—*Southern Med. Jl.* 1932. Mar. Vol. 25. No. 3. pp. 291–296. [40 refs.]

A general historical account with special reference to recent investigations. *E. H.*

Hoffmann (W. H.). Gelbfieber und Gelbfieberforschung. [**Yellow Fever and Yellow Fever Investigations.**]—Reprinted from *Ergebnisse d. Gesamt. Med.* 1931. Vol. 17. No. 1/2. pp. 113–170. With 4 text figs.

A good general account of the subject. *E. H.*

Rho (Filippo). **Nephritis, Nephrosis, and the Characteristic Hepato-Nephrosis of Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1932. Jan. 15. Vol. 35. No. 2. pp. 17–20.

A general account of the subject, containing nothing original. *E. H.*

Hindle (Edward). Démonstration de méthodes de manipulation de moustiques et expériences de transmission de la fièvre jaune.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. p. 473.

Hindle (Edward). Démonstration d'une méthode de préparation du vaccin antiamaril sec.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. p. 474.

Hoffmann (W. H.). Las inclusiones intranucleares en la fiebre amarilla.—Reprinted from *Rev. Med. y Cirug. Habana.* 1931. Vol. 36. No. 11. pp. 795–807.

Pettit (A.) & Stefanopoulo (G. J.). [Démonstrations histologiques relatives à la fièvre jaune chez le macaque du Nord-Africain (*Macacus innuus* L.).—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 474–475.

Sawyer (W. A.) & Frobisher (Martin), Jr. The Reactions of Various Animals to Yellow Fever Virus.—*Ier Congr. Internat. de Microbiol., Paris, 1930.* 1932. Vol. 2. pp. 476–482.

AMOEBIASIS AND DYSENTERY.

Amoebiasis.

Bach (F. W.). Untersuchungen ueber die Verbreitung parasitischer Darmprotozoen des Menschen, insbesondere *Entamoeba histolytica*, in Nordwestdeutschland. [**Distribution of *E. histolytica* and Other Intestinal Protozoa in N. W. Germany.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Jan. 16. Vol. 113. No. 2 & 3. pp. 321–344. [50 refs.]

Examination for parasitic intestinal protozoa of 1,000 subjects, none of whom had any intestinal troubles, in Northwest Germany, revealed 34 per cent. infected with intestinal protozoa: *Entamoeba coli* 21·7 per cent.; *E. histolytica* 5·7 per cent.; *E. hartmanni* 1·7 per cent.; *Endolimax nana* 5·6 per cent.; *Iodamoeba bütschlii* 3·1 per cent.; *Lamblia intestinalis* 5·5 per cent.; *Chilomastix mesnili* 0·4 per cent.

H. M. Hanschell.

Simić (Tshedomir). Etude expérimentale complémentaire de l'*Entamoeba dispar* Brumpt, de Skoplje, sur le chat. [**Experimental Study of *E. dispar* in the Cat.**]—*Ann. Parasit. Humaine et Comparée.* 1931. Nov. 1. Vol. 9. No. 6. pp. 497–502.

The author gives details of his further experimental studies on the non-pathogenic *Entamoeba dispar* found by him in Skoplje [*ante*, p. 250]. The strain of *E. dispar*, with which he had infected six persons, proved infective in seven young cats, of which five were successively infected one from the other. Although this amoeba maintained its existence 41 days in the cat, with five successful subinoculations in the cat, its epidemiological character remained unaltered. The amoeba though infecting the cat provoked in that animal no macroscopical lesions, even when the cat's rectum contained numerous amoebae; these amoebae were non-haematophagous. The author claims that since this *Entamoeba dispar* found in Skoplje presents biological characters identical with those described by Brumpt for his *E. dispar* of Paris, there is no question here of a local race of amoeba but plainly a definite species, non-pathogenic for man, whose existence ought now to be admitted in all European countries. *H. M. H.*

Leake (Chauncey D.). **Chemotherapy of Amebiasis.**—*Jl. Amer. Med. Assoc.* 1932. Jan. 16. Vol. 98. No. 3. pp. 195–198. With 1 text fig. [27 refs.]

An interesting and detailed critical review. Amoebiasis is a protozoan infection in which a variety of unrelated chemicals have some effectiveness, difficult to estimate quantitatively by laboratory experiment. To determine the use of different groups of such agents for the different phases of the disease is a clinical problem. Laboratory studies, such as here reviewed, may aid in pointing out the groups of drugs that give most promise of general usefulness and in determining which individual compound of a related series approaches most closely a definable ideal. Quantitative experimental methods in this field are hard to standardize, but, in agreement with Dobell, effectiveness in monkey amoebiasis may be said to be the best laboratory criterion, if taken in conjunction with quantitative toxicity and pathological studies. The evidence

here presented indicates little hope of finding an ideal agent among the kurchi or ipecac. alkaloids, since the former seem too ineffective and the latter too dangerous in effective doses. Insufficient data are at hand to evaluate properly the place of alkyl resorcinols in the therapy of amoebiasis, but they deserve full investigation and the clinical success of bismuth salts also merits attention. Even hurried experimental survey of the halogenated oxyquinolines indicates that at least one other compound in this group, iodochloroxyquinoline, or vioform, N.N.R., is likely to prove much better in amoebiasis than sodium-iod oxyquinoline sulphonate, or chiniofon, N.N.R. Indeed vioform is the most efficient so far tried in monkey amoebiasis and in its therapeutic range it is apparently non-toxic.

Among the arsenicals experiment already reveals compounds better than the only one, acetarsone, so far given clinical consideration. Controlled clinical trial of 4-carbamino-phenyl-arsonic acid (carbarsone) based on preliminary experimental data, indicates its superiority to any amoebicide in ordinary use, especially in its marked effectiveness in non-toxic doses. In comparison with other chemical types of amoebicides, the organic arsenicals are significant in manifesting a general tonic effect, difficult to evaluate experimentally but clearly evidenced clinically; but they may exhibit toxic effects which make it expedient to employ them cautiously. *H. M. H.*

Manson-Bahr (P.). **Modern Methods of Treatment of Intestinal Amoebiasis.**—*Proc. Roy. Soc. Med.* 1931. Sept. Vol. 24. No. 11. pp. 1538–1545 (Sect. of Trop. Dis. & Parasit. pp. 46–53).

The author notes the difficulty of making sure that a case of intestinal amoebiasis has been cured. Natural cure occurs, and he has observed relapse after a seven years' interval of apparent cure. The comparative worth of different methods of treatment is therefore hard to assess. In this paper he has made a valuable contribution to knowledge and practice, for the conclusions set out are based on recorded observations during the last eleven years on 329 cases of intestinal amoebiasis—all Europeans whose subsequent careers could be traced; he has excluded his non-European cases on whom follow-up observations were not possible. These 329 cases comprised all clinical forms of the disease, and diagnosis and treatment in each case were established and checked by approved and tested methods of clinical, microscopical, and sigmoidoscopical research. *E. histolytica* was demonstrated in each case.

The cases come into three therapeutical period-groups: viz. 1920–24, emetine bismuth iodide treatment, 127 cases; 1925, inauguration of yatren treatment 21 cases; and 1926–31, combined E.B.I. and yatren treatment, 181 cases. While these observations then lack that perfection of control given only by the strict alternate treatment, with rigid non-selection of cases as they come, yet this paper clearly shows that the control observations provided by the long successive periods of different treatment, with the large number of patients in each period, have in fact presented evidence of significant value to determine the better treatment, which is shown to be the combined E.B.I. and yatren. Indeed after 1925 with the minor but accumulative discomforts and physical penalties of the original E.B.I. treatment obviously beneficially alleviated and averted by the addition of yatren and a more liberal and sustaining diet, the strict alternate treatment of human

patients could hardly have been pursued for long. The author declares the E.B.I. treatment (Dale and Carmichael Low 1916) a great advance on anything that had gone before, but one trying to patients and not least so on account of the strict milk diet enforced. Some could not tolerate the drug in therapeutic dose (grains 3) at all; some developed toxic symptoms; and some, who had had emetine injections before the E.B.I. course, "neuritis." The E.B.I. patients became mentally depressed and lost weight and an average of 20 mm. Hg. systolic blood pressure. He had had ten cases of acute clinical relapse with demonstration of the entamoeba in the stools within 6 weeks of cessation of E.B.I. treatment. Three cases had relapsed after 9 separate courses of E.B.I. 30 grains each—probably the parasite had become emetine-fast. Three E.B.I. cases had subsequently been readmitted to hospital with hepatic abscess.

In 1921 Mühlens and Menk introduced yatren for treatment of amoebic dysentery. The author's sigmoidoscopical observations forced on him the conclusion that greatest extent of amoebic ulceration was present in sigmoid colon and rectum, especially in the last two inches, and that emetine released from decomposition of E.B.I. did not act on lesions in sigmoid and rectum, but did act on lesions in caecum and ascending colon; furthermore yatren enemata did heal the lesions in rectum and sigmoid. He then decided on a trial of the combined E.B.I. and yatren treatment. This consists of the "routine" E.B.I. at nights, altered for those, especially women, who cannot tolerate E.B.I., to emetine periodide; and in the morning after preliminary cleansing of bowel by sodii bicarb. enema, 8 oz. of 2½ per cent. solution of yatren is slowly and gently run into rectum, and is retained as long as possible by the patient. A light but liberal diet is allowed and the treatment course lasts 10 days. After-treatment consists in taking 2 pills of yatren (grains 4 each) at night for 3 weeks; with gradual and careful return to full diet.

Of the 181 cases thus treated two only relapsed, and these obtained apparent cure on repetition of the combined treatment, but this time with 5 per cent. yatren clyster.

[In this abstract much important detail has perforce been omitted. Readers are advised to consult the paper itself.] *H. M. H.*

i. Manson-Bahr (Philip). **Amoebic Abscess of the Liver: its Diagnosis and Treatment. A Clinical Study.**—*Proc. Roy. Soc. Med.* 1931. Dec. Vol. 25. No. 2. pp. 233–242 (Sect. Trop. Dis. & Parasit. pp. 1–10).

ii. Kilner (T. P.). **Operative Procedures in Amoebic Abscess of the Liver based on Recent Experiences.**—*Ibid.* pp. 242–245 (Sect. Trop. Dis. & Parasit. pp. 10–13).

i. A careful clinical study of 45 cases, fully reported and discussed, illustrating clearly the great variety of symptoms and physical signs which may proclaim [or too often hide] hepatic abscess; the value of emetine in hepatitis and hepatic abscess; and the treatment of hepatic abscess by aspiration.

ii. A detailed report on the procedures of exploration and aspiration of the liver in cases of hepatitis and hepatic abscess. Open drainage,

by rib resection, is reserved for those abscesses from which the aspiration pus has indicated definite secondary infection.

[Readers are advised to consult both these papers.] *H. M. H.*

Reed (A. C.), Anderson (H. H.), David (N. A.) & Leake (C. D.). **Carbarsone in the Treatment of Amebiasis.**—*Jl. Amer. Med. Assoc.* 1932. Jan. 16. Vol. 98. No. 3. pp. 189–194. [Refs. in footnotes.]

In this important paper the authors give full details of 40 unselected cases of amoebiasis, some of them with acute dysentery ; in all presence of *E. histolytica* was demonstrated. Their observations lead them to conclude that with rigorous but arbitrary criteria of "cure" (the average follow-up period of the cases was 4½ months) "carbarsone" meets more closely than any other drug now exploited the ideal requirements of an anti-amoebic agent. "Carbarsone" was first prepared by Ehrlich. It is 4-carbamino-phenyl-arsonic acid, containing 28·8 per cent. of arsenic. The recommended dosage is 75 mgm. per kilo in divided amounts over at least ten days. The arsenic in the compound seems to be rather slowly absorbed and eliminated after oral administration. Practically this dosage amounts in the average adult to 0·25 gram twice daily for ten days, given in gelatin capsules by mouth. It should not be used in amoebic hepatitis or in doses which might cause symptoms of arsenic toxicity [? dermatitis : ? jaundice]. It is clinically non-toxic in effective doses ; it may conveniently be administered orally without interference with the patient's usual way of life, it has no untoward side actions and it is comparatively cheap. There is no evidence as yet that it may be of prophylactic value.

H. M. H.

Sobhy (G.). **The Effect of Chronic Amoebic Infection on the Internal Functions of the Liver and the Application of this Knowledge in Therapeutics.**—*Jl. Egyptian Med. Assoc.* 1932. Jan. Vol. 15. No. 1. pp. 23–27.

Examination of a series of cases—(*a*) Chronic amoebic infection as proved by microscopical examination of stools and sigmoidoscopy ; 15 cases. (*b*) Acute amoebic dysentery, 5 cases. (*c*) Other parasitic dysenteries, bilharzial, etc., 3 bacillary cases ; 7 bilharzial cases. All thirty cases were subjected to following tests for liver function, viz. : Van den Bergh reaction ; nitrogen partition ratio ; laevulose tolerance curve ; Roger's glycuronic acid reaction ; Ehrlich's aldehyde reaction. All the 15 chronic amoebiasis showed marked deficiency of liver functions, whereas in all the rest these functions were shown to be intact.

In view of this result the author is dubious, indeed all but condemnatory, of the use of stovarsol in the cases, for arsenical preparations such as stovarsol are indubitable liver poisons. *H. M. H.*

Spector (Bertha Kaplan). **A Comparative Study of Cultural and Immunological Methods of diagnosing Infections with** *Endamoeba histolytica*.—*Jl. Preventive Med.* 1932. Mar. Vol. 6. No. 2. pp. 117–128. [15 refs.]

The author's conclusions drawn from her experimental data are : (1) The following medium proved highly satisfactory for growing *E.*

histolytica; slants prepared from three parts of inactivated Wassermann-negative human serum and one part of 0·85 NaCl, overlaid with a mixture of one part sterile inactivated Wassermann-negative human serum and six parts of either NaCl or Ringer's solution. (2) In the detection of *E. histolytica* infections, cultural methods are probably superior to direct faecal examinations. (3) A negative complement fixation test for *E. histolytica* does not always signify the absence of infection with *E. histolytica*, because individuals vary in the formation of complement-fixing antibodies and because treatment with emetine sometimes alters the reaction. (4) Likewise, a positive complement fixation test may not signify an infection with *E. histolytica*. (5) Skin and precipitin tests are, as yet, inadequate for the diagnosis of *E. histolytica* infections. [*H. M. H.*

Hegner (Robert), Johnson (Carl M.) & Stabler (Robert M.). **Host-Parasite Relations in Experimental Amoebiasis in Monkeys in Panama.**—*Amer. Jl. Hyg.* 1932. Mar. Vol. 15. No. 2. pp. 394–443. With 3 text figs. & 43 figs. on 6 plates. [25 refs.]

The subject is treated with great thoroughness and detail in a well illustrated and valuable paper. The work was begun at the Gorgas Memorial Laboratory in Panama City and completed at the Johns Hopkins University and the University of Pennsylvania. The material consisted of trophozoites of *E. histolytica* from human cases of intestinal amoebiasis, many cysts of *E. histolytica* from human carriers, and many monkeys belonging to 7 species, of which 10 brown howler monkeys, one red spider monkey, and one marmoset were successfully infected, spider monkey and 4 brown howlers with cysts *per os*, and the marmoset and 6 brown howlers with trophozoites per rectum.

(2) The authors propose a revised terminology for the types of *E. histolytica* encountered, on basis of localization and morphology—thus (i) tissue-dwelling amoebae, located in tissue of intestinal wall; (ii) lumen amoebae, living in lumen of intestine and not invading the wall; (iii) pre-cystic amoebae—either become cysts or are evacuated; (iv) stool amoebae—lumen amoebae that are evacuated; (v) degenerate amoebae—in tissues, lumen or stools.

(3) Their observations indicate that most of enormous numbers of trophozoites in the gut lumen do not come from tissues, as is generally believed, but are descendants of amoebae living only in lumen.

(4) Trophozoites of *E. histolytica* obtained through proctosope do not form ectoplasmic pseudopodia, such as are usually described in stool amoebae, but advance rapidly in an even, continuous manner, the anterior end being a single broad pseudopodium. No ectoplasm is visible except when amoeba pauses or changes course, when ectoplasmic pseudopodia are advanced explosively at sides anterior to centre of body. Rate of locomotion averaged 240 microns per min. or 14·4 mm. per hour.

(5) Average size of trophozoites—stool amoebae 21·03μ to 23·66μ; lumen amoebae 22·84μ to 23·72μ; tissue amoebae 20·24μ.

(6) Excystation *in vivo*; cysts of *E. histolytica* did not excyst in the colon of a brown howler monkey into which they were injected. Cysts injected into stomach showed no signs of excystation within 2½ hours in the stomach, but proceeded to excyst in the small intestine within from 2 hours and 20 mins. to three hours.

(7) Excystation: Cytoplasmic movement was first observed inside the cyst wall; then part of the protoplasm emerged through an

opening in the cyst wall but soon flowed back again ; this was repeated 6 or more times ; then the entire organism succeeded in escaping and leaving cyst wall behind. No division of the excysted amoeba was observed.

(8) Excystation of immature cysts. Stained preparations of material containing excysting amoebae revealed that uninucleate and binucleate as well as quadrinucleate cysts excyst.

(9) Changes in cysts in faeces after deposition. One stool contained 82 per cent. uninucleate, 9 per cent. binucleate, and 9 per cent. quadrinucleate cysts 5 hours after it was deposited. 22 hours and 20 minutes later it contained 59 per cent. uninucleate, 29 per cent. binucleate and 12 per cent. quadrinucleate cysts, thus demonstrating that development occurs in cysts after deposition. Development within cysts that had been injected *per os* into monkeys was very rapid. No correlation was found between size of cysts and number of nuclei contained in them. Size of nuclei in cysts containing different numbers of nuclei was very constant, the averages being 4·58μ for uninucleates, 3·08μ for binucleates, and 2·30μ for quadrinucleates. No constant arrangement of the nuclei within the cysts could be demonstrated. The amount of glycogen was greatest in uninucleates, least in quadrinucleates. Glycogen vacuoles were present in a higher percentage of uninucleates 5 hours after deposition (64 per cent.) than in uninucleates 27⅛ hours after deposition (18 per cent.). Two cysts of *E. histolytica* were noted with 8, and one with 7 nuclei. Chromatoid matter was less abundant in quadrinucleate than uni- and binucleate cysts. Chromatoid matter decreased while cysts were in faeces outside body. Chromatoid bodies were often in pairs of equal size.

(10) No essential differences were observed in incidence of infection with intestinal protozoa between Rio Chico Indians of the Chucunaque Valley, and natives of Panamanian villages.

(11) No infections with *E. histolytica* were found in 8 dogs and 85 cats obtained from Panama villages.

(12) Twenty-four individuals belonging to 6 species of monkeys were inoculated with *E. histolytica* from man ; 12 monkeys belonging to 3 species were infected. Injuries of intestinal wall due to the amoebae were observed in all 12.

(13) In monkeys inoculated with cysts *per os*, the amoebae apparently penetrate the mucosa by breaking through the epithelial layer between the glands and by migrating by amoeboid movement either between basement membrane and glandular epithelium, or along fibres of membrana propria. During the migration cells of glandular epithelium are dislodged. The amoebae congregate under base of glands.

(14) Follicular ulcers appear to be of bacterial origin. No amoebae were found within these ulcers nor in the tissue surrounding them.

(15) Extensive migration of solitary amoebae occurs *post mortem* but no amoebae were observed within follicular ulcers. Groups of amoebae had wandered into the lymph spaces in the submucosa and muscle layers and into blood vessels.

(16) No amoebae were observed penetrating the muscularis mucosae and the material furnished no direct evidence as to how amoebic ulcers are formed in the submucosa.

(17) Infections with trophozoites inoculated per rectum were more severe and the lesions were produced much more rapidly than those of cysts *per os*. It is suggested that the trophozoites, which came from acute human cases were more virulent than those that emerged from

cysts from carriers. Furthermore the trophozoites were already mature and were placed directly at the primary site of infection; whereas the excysted amoebae had to divide and grow to maturity and migrate, or be carried to the primary site of infection from the small intestine.

(18) Lesions in a freshly fixed human appendix consisted of two small ulcers in the lymphoid tissue beneath the glands. These ulcers contained relatively few amoebae which were in contact with apparently normal lymphoid tissue. *H. M. H.*

FAUST (Ernest Carroll). **Experimental Amebiasis in Dogs.**—*Amer. Jl. Trop. Med.* 1932. Jan. Vol. 12. No. 1. pp. 37–47. [22 refs.]

———. **Susceptibility, Resistance and Spontaneous Recovery in Dogs experimentally infected with** *Endamoeba hystolytica.*—*Proc. Soc. Experim. Biol. & Med.* 1932. Feb. Vol. 29. No. 5. pp. 659–661.

A study of infection of dogs with canine and human strains of *Entamoeba histolytica*; 65 dogs received inocula of canine strains and 20 of human strains. 93 per cent. of the former and 65 per cent. of the latter became infected. The prepatent period for canine strains averaged 8·4 days and for human strains 3·6 days. No clinical or pathological differences were observed between canine and human strains. Liver products had ameliorating effect on the course of the amoebic enteritis. The types of amoebic enteritis produced included acute fulminating dysentery; chronic enteritis; convalescent carrier conditions; temporary infection followed by apparent spontaneous recovery; and amoebiasis in animals which died of intercurrent animal and bacterial infections. Amoebic hepatitis was never observed in the series.

Site of lesions of amoebic enteritis in dogs, their depth and histological structure were on the whole comparable with lesions found in human amoebic enteritis. The author holds it probable that differences in type of amoebic lesions in kitten and in man are result of acuteness or chronicity of infection; a view substantiated by lesions in the dog, where an acute fulminating attack is produced by extensive shallow ulceration resulting in excessive absorption of toxins which at times causes death of the animal before the deeper lesion develops. Less active erosion over less extensive areas allows the amoebae to migrate down into the crypts, penetrate muscularis mucosae, invade deeper layers and form the undermining ulcer. *H. M. H.*

BACILLARY DYSENTERY,

BURNET (F. M.), MCKIE (Margot) & WOOD (I. Jeffreys). **A Study of Bacteriophage in Relation to Infantile Bacillary Dysentery.**—*Med. Jl. Australia.* 1931. Dec. 5. 18th Year. Vol. 2. No. 23. pp. 714–716. [10 refs.]

The authors conclude that administration of a highly active polyvalent Flexner bacteriophage had no influence on the course of infantile dysentery. Omitting cases due to Sonne strains and atypical Flexner types, there were 58 cases of true Flexner infections—25 treated, 33 controls. In the treated series 11 deaths occurred (44 per cent.); and in the controls 9 (27 per cent.). Clinically no definite good or bad effect

could be described to the use of phage, and the higher mortality in the treated series was probably fortuitous. More detailed analysis showed that age of patient and time elapsing between onset of disease and admission to hospital were much more important than administration of phage. *H. M. H.*

KUROI (C.), SUZUKI (T.), MAI (H.), YOKOYAMA (Z.) & KAWASHIMA (T.). **Experimental Oral Vaccination against Dysentery.**—*Jl. Public Health Assoc. Japan.* 1932. Feb. Vol. 8. No. 2. pp. 1–3.

The vaccine, which is given in pill form, is prepared by concentration of a broth culture at 50°C. In this vaccine there is an admixture of typical and atypical dysentery strains. *W. F. Harvey.*

MARTODIWIRIO (R. Soemardjo) & THIERFELDER (M. U.). Massa-behandeling met rivanol bij dysenterie-epidemieën. [**Mass Treatment with Rivanol in Epidemics of Dysentery.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Mar. 1. Vol. 72. No. 5. pp. 258–268. With 3 graphs.

Founding their judgment upon their experience in rural districts in Java the authors arrive at the following conclusions :—

(1) Rivanol is a very useful drug in combating epidemics of dysentery (amoebic as well as bacillary).
(2) Non-dysenteric intestinal catarrhs do well too under this treatment.
(3) Being administered in small doses (adults 3 times per day 50 mgm. in pills, children correspondingly smaller doses) rivanol is cheap.
(4) No untoward effects or idiosyncrasy against the drug was seen.
(5) The native population is interested in this treatment and takes it willingly.
(6) Its administration may be left to laymen.
(7) The rivanol cure must be preceded by a laxative.
(8) The faeces were free from amoebae after the course.
(9) In fresh cases any other treatment is superfluous ; in older serious cases combination with emetine or yatren may be of use.
(10) Even serious epidemics may be cut short by rivanol distribution. *W. J. Bais.*

CASPARI (J.). Einige Bemerkungen zur Klinik der Kinderdysenterie in wärmeren Ländern (insbesondere zur Behandlung mit Emetin und Rivanol).—*Muench. Med. Woch.* 1932. Mar. 11. Vol. 79. No. 11. pp. 420–422.

CRAIG (Charles F.). Observations on the Use of Kendall's Medium in the Cultivation of *Endamoeba histolytica.*—*Proc. Soc. Experim. Biol. & Med.* 1932. Feb. Vol. 29. No. 5. p. 663.

DESCHIENS (R.). Indications pratiques sur le transport des formes végétatives d'amibes dysentériques.—*Bull. Soc. Path. Exot.* 1932. Mar. 9. Vol. 25. No. 3. pp. 207–210.

EGUCHI (J.). Efficacité du bilivaccin dans la prophylaxie de la dysenterie et de l'ekiri.—*Bull. Office Internat. d'Hyg. Publique.* 1932. Feb. Vol. 24. No. 2. pp. 297–299.

HIYEDA (K.). On Amoebic Dysentery in Manchuria.—*Jl. Oriental Med.* 1932. Mar. Vol. 16. No. 3. [In Japanese. English summary p. 37.]

Hogue (M. J.). The Effect of Four Amoebicidal Drugs on the Tissues of the Digestive Tract grown in Vitro.—*Amer. Jl. Trop. Med.* 1932. Mar. Vol. 12. No. 2. pp. 149–171. With 2 text figs. & 6 figs. on 3 plates.

Lemierre (A.) & Lévesque (Jean). Hippocratisme digital et amibiase intestinale.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Feb. 8. 48th Year. 3rd Ser. No. 4. pp. 154–156.

Macfadyen (J. A.). The Clinical Significance of Amoebiasis.—*South African Med. Jl.* 1932. Jan. 9. Vol. 6. No. 1. pp. 16–18.

McKneely (T. B.). Amebic Infection in Louisiana and in the Marine Hospital at New Orleans.—*Milit. Surgeon.* 1932. Mar. Vol. 70. No. 3. pp. 270–272. [3 refs.]

Murray (Florence J.) & Koh (P. K.). Amoebic Liver Abscess.—*Canadian Med. Assoc. Jl.* 1932. Mar. Vol. 26. No. 3. pp. 312–317.

Tsuchiya (H.). A Simple Culture Medium for *Endamoeba histolytica*.—*Proc. Soc. Experim. Biol. & Med.* 1932. Jan. Vol. 29. No. 4. pp. 347–348.

Verdurmen (A.). Dysenterie amibienne aiguë et arsenic.—*Bruxelles-Méd.* 1932. Feb. 28. Vol. 12. No. 18. pp. 509–510.

BLACKWATER FEVER.

Ross (G. R.). **Researches on Blackwater Fever in Southern Rhodesia.** —No. 6 of the *Memoir Series of the London School of Hygiene & Tropical Medicine.* 1932. pp. vi+262. With 24 charts & 1 map. [Numerous refs.] 1932. London: School of Hygiene & Tropical Medicine, Keppel Street, Gower Street, W.C.1. [10s. 6d. cloth; 8s. paper.]

This report deals with the work done by the author as Rhodesian Research Fellow during the four years April, 1925, to April, 1929. It is divided into three parts, the first of which is concerned with the epidemiology of the disease. In a chapter describing the distribution of blackwater fever in the population of Southern Rhodesia an interesting table is given recording the number of cases of the disease admitted to hospital, and the number of fatal cases during each of the years 1914 to 1928. The total cases numbered 679 and the deaths 152, giving a fatality rate of 22·2 per cent. It is perhaps significant that whilst the fatality rate varied greatly in different years, e.g. from 5 per cent. in 1924 to 36 per cent. in 1927, it showed no general tendency to decrease during the 15 years under consideration. During the 4 years 1914 to 1917, 198 cases were admitted to hospital and 48 (24·2 per cent.) died, whereas during the last 4 years of the period the figures were 147 cases and 41 (27·9 per cent.) deaths. These figures, which are by no means unique, might with great advantage be borne in mind by those who, being more highly endowed with optimism than with critical judgment, see fit from time to time to make outrageous claims for the success of particular lines of treatment based upon the observation of half a dozen cases, and occasionally, alas, only on one or two. This chapter, which contains much that is important, brings out clearly the intimate association of the disease with rural conditions. The higher incidence of the disease in rural inhabitants, as compared with urban inhabitants generally, and the high incidence in those engaged in pioneer occupations, both help to establish this fact.

The next chapter deals with the seasonal incidence and local distribution of blackwater fever and its correlation with meteorological conditions in Southern Rhodesia. It has been shown over a period of years that the incidence of blackwater fever tends to increase regularly in certain months. The curve of increase to the maximum and decline to the minimum follows with regularity the curve of the rainfall after an interval of three months. This chapter is followed by a lengthy discussion of the association between malaria and blackwater fever in Southern Rhodesia; and the conclusion of many previous observers that blackwater fever is a manifestation of malarial toxicity is substantiated.

The last two chapters deal respectively with quinine as an exciting cause of the disease, and with exciting causes other than malaria and quinine.

Part 2 is concerned with the blood and urine in blackwater fever. The author has rightly assessed the importance of examination of these fluids in any investigation designed with the object of elucidating some of the many mysteries of blackwater fever. In Chapter I the changes in the cellular elements of the blood and in the plasma are considered. While much valuable information has been collected, it is unfortunate that the author was unable to make any quantitative estimations on

the degree of haemoglobinaemia. The matter is of such importance for an understanding of the mechanism of the disease, and so many diverse statements, based frequently on the most slip-shod and inadequate observation, appear in the literature of the subject, that new and carefully made quantitative estimations of the haemoglobinaemia in blackwater fever are greatly to be desired. The next chapter contains a valuable collection of observations on the chemistry of the blood in malignant tertian malaria and blackwater; and this is followed by a chapter dealing with icterus in the two diseases.

Chapter 4 is concerned with the question of the relation of sarcolactic acid and blackwater fever. Ross finds himself unable to give support to the theory of BLACKLOCK and MACDONALD [see this *Bulletin*, Vol. 25, p. 901].

In the following section the changes in the urine are dealt with very fully. Summing up his observations on the all-important subject of the mechanism of suppression of urine in blackwater fever, the author writes as follows :—

" One is thus forced to conclude that suppression cannot be entirely explained by the assumption that it depends principally upon the sodium chloride content and the acidity of the urine. If the phenomenon is to be explained by purely physicochemical reasons, the part played by other electrolytes present in the urine would seem to be equally important to that played by sodium chloride. It seems preferable to adopt the view of Yorke and Nauss (1911) that precipitation depends upon the degree of concentration of the urine and is facilitated by any factor which interferes with the secretion of water by the malphigian body. This may result from damage as a result of the excretion of the foreign protein haemoglobin, from lowering of the blood-pressure, or for more obscure reasons."

Part 3 consists of clinical observations and of remarks on the prophylaxis and treatment of the disease. The remarks of the author on the subject of the alkaline treatment of blackwater fever are worthy of note. He writes, this method of treatment " has received most extensive publicity and there is some danger of its being regarded as a panacea. One fact, however, deserves emphasis. Despite the number of authors who have published their findings the total number of cases covered by their reports is small. Thus two report on one case, while in another instance two cases form the basis of the report. There is thus ample justification for the critical to wonder whether the ordinary probability of recovery is sufficiently allowed for." After a careful consideration of all the known facts, Ross sums up his views as follows :—

" In an earlier section of this report, the author has expressed himself as not wholly satisfied with the explanation of the mechanism of suppression as given by Baker and Dodds. While he agrees with these authors that, in *in vitro* experiment, precipitation of haemoglobin takes place according to the conditions they describe, he believes that the time necessary for precipitation to occur is such that it is difficult to imagine such changes taking place during the passage of urine down the renal tubule. He has stated his preference for the older view of Yorke and Nauss (1911) that precipitation depends upon the concentration of the urine and is facilitated by any factor interfering with the secretion of water by the malphigian body. He is thus not inclined to favour the alkaline treatment more than any form of treatment which has copious diuresis as its object."

In the reviewer's judgment, Ross is to be congratulated on an excellent piece of work. Not only has he made many valuable observations himself, but he has collected together from an enormous

and scattered literature the relevant observations of other workers and has brought the whole mass together into a single volume of moderate size, wherein it is possible to discover the present position of knowledge on any of the many problems which this mystifying disease presents. It is greatly to be hoped that the monograph will circulate widely amongst those who are interested in blackwater fever, and that it will be carefully read by anyone who contemplates writing on any aspect of the subject. Possibly its perusal may cause many to refrain from adding to an already over-burdened literature. From the reviewer's point of view this would be a most desirable result. In any case, the novice will at least realize that he is not the first to work on the disease, but that some facts are known, e.g. 75 per cent. of cases recover whatever treatment be administered, and consequently it is futile to advocate a certain method of treatment because two or three cases have recovered in spite of it. Careful study of the monograph will, however, do more than this ; it will reveal to the serious student the gaps in knowledge, and will suggest to him lines along which he can with profit pursue his enquiries. *W. Yorke.*

REVIEWS AND NOTICES.

KNOWLES (R.), GUPTA (B. M. Das) & BASU (B. C.). **Studies in Avian Spirochaetosis. Parts I & II.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1932. Feb. Memoir No. 22. 113 pp. With 11 plates (7 coloured) & 1 chart in text. [11 pages of refs.]

The first part of this memoir, comprising 48 pages, is devoted to a review of the previous literature and includes summaries of 180 papers on avian spirochaetosis. This is by far the most complete summary of the subject that has appeared, and will be invaluable to future workers, since much of the literature is very scattered and often difficult of access.

The second part is a detailed account of the authors' work on avian spirochaetosis in India. Their main results have been published previously [see this *Bulletin*, Vol. 27, p. 110] but the present memoir contains details of additional experiments and observations. Fowls were readily infected by the oral ingestion of infected material, either blood, ticks or the ova laid by infected ticks, in addition to the usual methods of inoculation including the percutaneous route. It is curious that the least efficient method of infection, with a 33·3 per cent. success rate, was exposure to the bites of infected *Argas persicus*.

The crisis seems to be the result of the production of agglutinins, immobilisins and lysins in the blood plasma, and within 48 hours after the disappearance of spirochaetes from the blood stream, all the organs, including the brain, were found to be free from the infection. As previously stated the authors were unable to find any evidence of the existence of any granule or spore formation in either the vertebrate or invertebrate host. They consider the so-called Balfour's granules the result of the extrusion of chromatin from the nuclei of erythrocytes poisoned by the toxins of the disease.

The life cycle in the tick is found to be the same as that previously suggested, namely the production of very fine " *tenue* " forms, by repeated division or multiple fission of the ordinary spirochaetes. These *tenue* forms invade the various organs, and especially the salivary glands and are considered the infective stage in the tick. Under the dark ground, or by special methods of staining, they show a very fine flagellum at each end.

The memoir should be read in its entirety by those interested in the subject. The authors' results, in the main, agree with MARCHOUX and COUVY's account of the production of very attenuated spirochaetes in the intermediate host. It is unfortunate that the authors failed to find any ocular evidence of infection in any of the eggs laid by infected ticks, although their own experiments confirm the undoubted fact that such hereditary transmission occurs. Apart from a single and very doubtful exception, figured in Plate X, nearly a thousand ova were examined with negative results and admitting the difficulty of seeing spirochaetes, especially *tenue* forms, inside the ovum, one would have expected them to have been found occasionally. The authors' belief that " spirochaetes always remain as spirochaetes morphologically " requires some modification in view of their own account, for the short and slender *tenue* form with a terminal flagellum at each extremity is markedly different from the ordinary spirochaete. Moreover among others, MARCHOUX and CHORINE [this *Bulletin*, Vol. 27, p. 701, and *C. R. Acad. Sci.*, Vol. 194, p. 917] have brought forward strong evidence in support of the view that the fowl spirochaete passes through a stage in which, although infective, it is no longer present as a spirochaete. *E. Hindle.*

EISMA (Molle). **De differentiatie van het derde stadium van de larven der ancylostomidae van mensch, hond en kat.** [Differentiation of Third Stage Larvae of Ancylostomidae of Man, Dog and Cat.] [Thesis for doctorate, Univ., Leiden.]—pp. viii + 152. With 99 figs. (29 on 8 plates). English summary. 1932. Haarlem: Boekdrukkerij M. H. Groenendaal.

This doctorate thesis describes what is claimed to be a new staining method for infective hookworm larvae. Live larvae are placed between slide and cover and methylene blue solution run in. Its strength is: Methylene blue 0·3, sod. bicarb 0·1, aq. destill. 100. In it the larva becomes unsheathed and on slight warming stains dark blue. Decolourization is effected by running 30 per cent. acetic acid through the preparation. Alternate staining and decolourization are continued till the preparation is satisfactory. On this basis is reported an investigation of the infective larvae of *Ancylostoma duodenale, A. braziliense, A. caninum, Necator americanus* and *Uncinaria stenocephala*. The report concerns itself with "a description of the front view of the head, the amphids, the newly identified 'organa fissuriformia' lying ventrally and dorsally on a level with the aphids, the mouth cavity, the oesophagus, with the oesophageal glands and the so-called zone of closing cells [between oesophagus and intestine], the intestine, the primordium genitale, the nervous system, the primordia of the cervical glands, the muscular system, some undefinable cells, the papillae caudales, the skin and the sheath." There follows a biometric analysis and differentiation of the five larvae, and lastly a chapter dealing with some data for their quick differentiation. This affords a useful summary of present knowledge and so far as concerns the three hookworms which one may expect to find in man deals with larvae whose tail is longer than 98μ. The generic differences are these :—

	Necator	Ancylostoma
Oral capsule	Sharply defined :— equally visible dorsally and ventrally	Hardly visible : more marked dorsally then ventrally
Tail	Rather blunt ...	Pointed
Zone of closing cells ...	Leaves only a small space between oesophagus and intestine	Leaves a considerable space here
Beginning of intestine ...	Is its widest part ...	Is hardly so

As distinguishing the two ancylostomes the striation of the sheath is indistinct in *A. duodenale*, very distinct in *A. braziliense*.

Clayton Lane.

BENARROCH (E. I.). **Estudios relativos al paludismo. VI. Metodos para el estudio del paludismo en Venezuela.** [Methods of Malaria Investigation in Venezuela.] With English Foreword.—112 pp. With 52 text figs. (1 coloured). 1931. Caracas: Tipografia Americana.

In the foreword to this brochure the author states that in it "there is nothing new for English speaking scientists and technicians." There is, therefore, no need for a detailed review of the work. This is No. 6 of ten studies published on the subject of malaria in Venezuela, the others

including: An investigation of the anopheline vectors; the persistence and fluctuations of gametocytes in the peripheral blood (see this *Bulletin*, Vol. 26, p. 366); malaria in Bolívar; field studies; three papers on treatment.

The present article may be regarded as directions or hints for those setting out to investigate, in the laboratory or in the field. There are chapters on making and staining blood films, examining fresh blood, on the parasitic and splenic indices, on distinguishing Anopheles from Culex and the species of anopheles from each other, dissection of mosquitoes, recording of topographical and other epidemiological data, etc., together with model forms for placing the information obtained on permanent record. A worthy addition to a useful series. *H. H. S.*

The Nomenclature of Diseases drawn up by a Joint Committee appointed by the Royal College of Physicians of London. Sixth Edition being the Fifth Revision (Subject to Decennial Revision).—pp. xx+220 1931. London: H.M.S.O. [5s.]

The Nomenclature of Diseases (fifth edition) was somewhat roughly handled in this *Bulletin* [1918, Vol. 12, p. 363] so that we are glad to note that the many errors and omissions then noted are now rectified. Indeed the page of additions to Diseases caused by Infection or Infestation (p. 149) justifies the strictures, for more than twenty of the new entries are "tropical." Sir Andrew Balfour and Col. W. P. MacArthur served on the Revision Committee on this occasion and exotic diseases were not forgotten. The section headed Parasites and Vectors of Disease has obviously been subjected to careful revision and the Summary of Diseases and Vectors will be an interesting landmark of the knowledge of 1931. The book has been so carefully revised that, apart from the vexed question of zoological nomenclature, there is little for the critic. Rocky Mountain fever has failed to get indexed and climatic bubo has escaped mention altogether though its lengthy equivalent, lymphogranuloma inguinale, appears under Lymphatic Gland Diseases. The genus *Wuchereria* appears as Wauchereria. *A. G. B.*

Strümpell (Adolf) & Seyfarth (E.). **A Practice of Medicine.** Authorised Translation from the Thirtieth German Edition by C. F. Marshall, M.D., F.R.C.S. & C. M. Ottley, B.M., F.R.C.S **Vol. I. Infectious Diseases. Diseases of the Respiratory and Circulatory Systems. Vol. II. Diseases of the Digestive and Urinary Systems. Diseases of the Organs of Motion. Diseases of Metabolism. Vol. III. Diseases of the Nervous System.**—pp. xxiii + 2356. With 392 text figs. & 17 plates. 1931. London: Baillière, Tindall & Cox, 7 & 8, Henrietta Street, Covent Garden, W.C. 2. [£5 5s. 0d.]

This book is reviewed in *Bulletin of Hygiene*, 1932, Vol. 7, p. 326.